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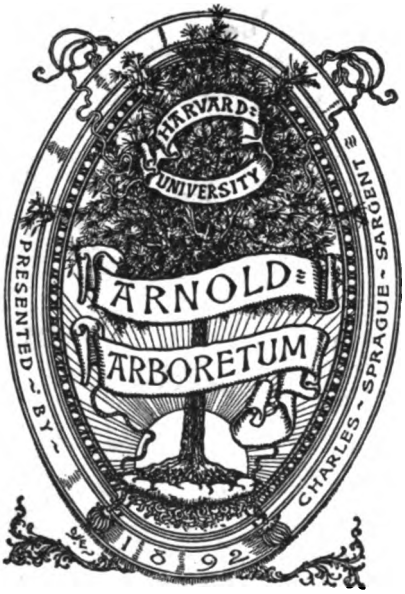

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SWEDEN

ITS PEOPLE AND ITS INDUSTRY

HISTORICAL AND STATISTICAL HANDBOOK

PUBLISHED BY ORDER OF THE GOVERNMENT

EDITED BY

GUSTAV SUNDBÄRG
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STOCKHOLM
GOVERNMENT PRINTING-OFFICE. P. A. NORSTEDT & SÖNER
1904

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PREFACE.

On the strength of a bill brought in by Professor Ernst Carlson, the Riksdag in 1898 granted a vote of credit for the compilation of a Handbook of Statistics on the cultural and industrial conditions of Sweden — to be published in Swedish, English, and French. The King having commissioned the Central Bureau of Statistics to carry out the work, this Bureau left the editorship of it into my hands.

During the progress of the work, a more plentiful supply of illustrations than originally intended was found desirable, and the means granted not proving sufficient for the purpose, the necessary amount was munificently donated by K. A. Wallenberg, Esq., Bank Director, Stockholm.

Of the three editions of the work, the *French* one was published in 1900 and partly distributed at the Paris Exhibition of that year. The *Swedish* edition appeared in 1901. The working out and printing of the *English* edition now laid before the public has through sundry unfavourable circumstances been considerably delayed, which, moreover, occasioned the disadvantage of the statistical data not being in all provinces the most recent obtainable. This fact need, however, not be considered a serious inconvenience, for in a summary review like the one here in question, a year or two cannot involve essential changes. Of the most important new measures taken in the way of Legislation and Administration, etc., and brought about while the work was passing through the press, an account is given in the Appendix at the end. — The Swedish edition was as a whole somewhat larger than the French one, and the English edition has in its turn been not inconsiderably amplified and supplemented.

In spite of a very considerable number of authors having furnished articles, it has been attempted by the editor, as far as possible, to let

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the whole rest on the same fundamental views. For the modifications effected aiming at this purpose, the editor is of course solely responsible. For the choice of illustrations, too, he alone must take the responsibility, and — with the exception of some few articles — for the statistical data likewise.

When now at last this work is presented to the public, the editor takes the opportunity to express his sincere and respectful thanks to all those who with their interest and work have contributed to its accomplishment, and at the same time he ventures to pronounce his hopes that, in some degree, it may discharge its mission among foreign nations of facilitating the diffusion of a correct idea about our Swedish country and people.

Stockholm, in February 1904.

Gustav Sundbärg.

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CONTENTS.

FIRST PART.

Page.

I. **Physical Geography** . . . . . 1.
1. Configuration and Water-system. By Docent *Gunnar Andersson*, Ph. D., Stockholm . . . . . 5.
2. Climate. By *N. Ekholm*, Ph. D., Central Meteorological Office, Stockholm . . . . . 23.
3. Geology. By *E. Erdmann*, Ph. D., State geologist, Stockholm . 36.
4. Vegetation. By Lector *A. Nilsson*, Ph. D., Institute of Forestry, Stockholm . . . . . 51.
5. Fauna. By Prof. *T. Tullberg*, Ph. D., Uppsala . . . . . 60.

II. **The Swedish People** . . . . . 68.
1. Survey of its History. By *E. Svensén*, Author, Stockholm . . 68.
2. Demography of Sweden . . . . . 91.

The Swedish language (p. 91), by Docent *O. von Friesen*, Ph. D., Uppsala.

3. National Characteristics. Moral and Social Conditions . . . . 134.

National Characteristics (p. 134). — Social Conditions (p. 141), by *Theophil Andersson*, Ph. D., Actuary at the Board of Trade, Stockholm. — Moral Conditions (p. 146). — Criminality (p. 150). — Customs and manner of living (p. 153), by *J. P. Velander*, Ph. C., Stockholm. — Dwellings (p. 159), by *F. Sundbärg*, City Architect, Landskrona.

4. The Swedish Lapps. By *F. V. Svenonius*, Ph. D., State Geologist, Stockholm . . . . . 166.

III. **Constitution and Administration** . . . . . 168.
1. Constitution . . . . . 169.

Historical Account and present Constitution (p. 169), by *E. Hildebrand*, Ph. D., Chief of the National Record Office, Stockholm. — The Composition of the Riksdag and its method of working (p. 179), by *J. P. Velander*, Ph. C., Stockholm. — The Union with Norway (p. 184), by *E. Arosenius*, Ph. D., Royal Central Bureau of Statistics, Stockholm.

Digitized by Google

Page.

2. State Administration . . . . . 190.
Historical Account and the present State Administration in general (p. 190), by *E. Söderberg*, Ph. D., First Actuary at the Royal Central Bureau of Statistics, Stockholm. — Official Statistics (p. 197). — Official Maps (p. 200), by *E. Sidenbladh*, Ph. D., Ex-Chief Director of the Royal Central Bureau of Statistics, Stockholm. — State Finances (p. 204), by *J. P. Velander*, Ph. C., Stockholm. — The Army (p. 210), by Lieut. Col. *H. Hult*, R. A., Stockholm. — The Navy (p. 222), by Commodore Capt. *H. Wrangel*, R. N., Stockholm. — The Administration of Justice (p. 228), by *Hj. Hammarskjöld*, L. L. D., President of the Göta Court of Appeal, Jönköping. — The Prison System (p. 233), by *K. Blomquist*, Prison Gov., Kristianstad. — Hygiene and care of the sick (p. 237), by *C. Waller*, M. D., Director of the Hålahult Sanatory, *C. Runborg*, M. D., Stockholm, and *G. Schuldheis*, M. D., Member of the Royal Medical Depart., Stockholm.

3. Municipal Administration. By *G. Aldén*, Deputy Editor, Stockholm 248.
Self-Government of the Communities (p. 248). — Poor Relief (p. 253). The Charity Organization Society (p. 258), by Mrs. *Agda Montelius*, Stockholm. — Self-Government of the Läns (p. 259).

4. Church and Religion. By *C. Fr. Lundin*, Ph. D., Uppsala . . 260.

5. Social Movements . . . . . 272.
The Woman Question (p. 272), by Miss *Gertrud Adelborg*, Stockholm. — The Temperance Movement (p. 276), by *K. Blomquist*, Prison Gov., Kristianstad, and *G. H. von Koch*, Editor, Stockholm. — Other Humanitary Movements (p. 285).

IV. **Education and Mental Culture** . . . . . 286.

1. Popular Education . . . . . 287.
Popular Education in general (p. 287), by *J. M. Ambrosius*, Ph. D., Inspector of the Common schools of Gothenburg. Vacation colonies, according to information received from *C. G. Bergman*, Ph. D., Inspector of the Common schools of Stockholm. — Educational Sloyd (p. 300). — Workshops for Children (p. 303), by Prof. *G. Retzius*, M. D., Stockholm. — Education of abnormals, and of neglected children (p. 305). Schools for the Deaf and Dumb (p. 305), by *Fr. Nordin*, Principal, Venersborg. Schools for the Blind (p. 309), by *G. A. Lyberg*, Principal, Vexjö. Schools for Idiots (p. 310), by late Baroness *Thorborg Rappe*. Working Schools for Disabled People (p. 311), by Mrs. *Alice Bonthron*, Gothenburg. — People's High Schools, Workmen's Institutes, and University Extension (p. 312), by *G. Aldén*, Deputy Editor, Stockholm. — Summer courses at the Universities (p. 317), by *A. Åkerlindh*, Ph. D., Uppsala.

2. Public Colleges and corresponding Institutions . . . . . 317.
Public Colleges (p. 317), Private Colleges for Boys and Mixed Schools (p. 329), by Prof. *Ernst Carlson*, Ph. D., Gothenburg, Member of the Riksdag. — Collegiate Schools for Girls (p. 329), by late Miss *Hilda Casselli*.

Digitized by Google

Page.

3. Higher Education. By Prof. *Ernst Carlson*, Ph. D., Gothenburg, Member of the Riksdag . . . . . 333.

4. Technical Education. By Lector *A. Söderblom*, Ph. D., Chalmers' Polytechnical College, Gothenburg . . . . . 342.

5. Swedish Gymnastics . . . . . 348.

Swedish Gymnastics (p. 348), by Prof. *L. M. Törngren*, Stockholm. — Medical Gymnastics according to Ling's system (p. 354), by *A. Wide*, M. D., Stockholm. — Zander's Medico-mechanical system of Gymnastics (p. 356), by *A. Levertin*, M. D., Stockholm.

6. Touring and Sport . . . . . 359.

Touring and Touring Facilities (p. 359), by *L. Améen*, Revising Commissioner, Stockholm. — Sport (p. 367), by Colonel *V. Balck*, R. A., Stockholm.

7. Public Collections and Institutions for Science and Art. Periodical Literature. By *B. Lundstedt*, Ph. D., Librarian at the Royal Library, Stockholm . . . . . 375.

Academies and Learned Societies (p. 375). — The Nobel Foundation (p. 378). — Other important legacies for culture (p. 381). Lars Hierta's Memorial Foundation (p. 381), by prof. *G. Retzius*, M. D., Stockholm. — Archives (p. 382). — Museums (p. 383). — The North Museum and Skansen (p. 387), by *N. E. Hammarstedt*, Amanuensis, North Museum, Stockholm. — Libraries (p. 393). — People's Libraries (p. 395), by *A. Dalin*, Common-school Head Teacher, Huskvarna. — Newspapers (p. 396).

8. Literature. By Lector *R. Steffen*, Ph. D., Örebro . . . . . 398.

9. The Fine Arts . . . . . 409.

Architecture (p. 409), by *F. Sundbärg*, City Architect, Landskrona. — Sculpture (p. 415) and Painting (p. 421), by Prof. *C. R. Nyblom*, Ph. D., Stockholm. — Music (p. 430), by *A. Lindgren*, Ph. D., Stockholm. — Dramatic Art (p. 433), by *F. Hedberg*, Author, Stockholm.

10. Science . . . . . 435.

In the editorial work of this section has assisted **K. Hildebrand**, Ph. D., Stockholm.

Theology (p. 435), by Dean *J. A. Eklund*, Kalmar. — Law (p. 436), by *Hj. Hammarskjöld*, L. L. D., President of the Göta Court of Appeal, Jönköping. — Philosophy (p. 438), by Prof. *V. Norström*, Ph. D., Gothenburg. — Philology (p. 441), after Docent *O. von Friesen*, Ph. D., Uppsala, and *E. J. Ljunggren*, Ph. D., Librarian, Lund. — History (p. 445). — Archeology, Numismatics, Swedish Ethnography, and Folk-lore (p. 448), by Docent *O. Almgren*, Ph. D., Uppsala. — History of Literature (p. 449), by Prof. *H. Schück*, Ph. D., Uppsala. — History of Art (p. 450), and Esthetics (p. 451), by Prof. *C. R. Nyblom*, Ph. D., Stockholm. — Pedagogics

Digitized by Google

Page.

(p. 453), by *N. Lagerstedt*, Ph. D., Stockholm. — Political Economy and Sociology (p. 454), by *J. Leffler*, Ph. D., Stockholm. — Statistics (p. 456).

Medicine (p. 458). Anatomy, by Prof. *G. Retzius*, M. D., Stockholm. Physiology, Medical Chemistry, and the Science of Drugs, by Prof. *C. G. Santesson*, M. D., Stockholm. Pathology, Etiology, Hygiene, Forensic Medicine, and Medical Jurisprudence, by Prof. *C. Wallis*, M. D., Stockholm, Member of the Riksdag. Internal Medicine, by Prof. *S. E. Henschen*, M. D., Stockholm. Surgery, by Prof. *J. Berg*, M. D., Stockholm. — Physical Anthropology (p. 465), by Prof. *G. Retzius*, M. D., Stockholm. — Botany (p. 465), by *H. Hesselman*, Ph. D., Stockholm. — Zoology (p. 470), by *Hj. Östergren*, Ph. D., Uppsala. — Geology and Mineralogy (p. 472), by *E. Erdmann*, State Geologist, Stockholm. — Physics (p. 475), by Prof. *K. Ångström*, Ph. D., Uppsala. — Chemistry (p. 477), by Prof. *H. G. Söderbaum*, Ph. D., Stockholm. — Mathematics (p. 480), by Prof. *M. Falk*, Ph. D., Uppsala. — Astronomy (p. 482), by Prof. *K. Bohlin*, Ph. D., Stockholm. — Meteorology and Hydrography (p. 484), by *N. Ekholm*, Ph. D., Central Meteorological Office. — Scientific Travels. Geography (p. 488).

Owing to limited space the various articles under the headings of Art and Science have of necessity been considerably abbreviated. For the selection of illustrations the Editor is solely responsible, here as elsewhere.

SECOND PART.

V. **Occupations and Industries. A general Survey.** By Prof. *P. Fahlbeck*, Ph. D., Lund, Member of the Riksdag . . . . . 497.

VI. **Agriculture and Cattle-Breeding** . . . . . 511.

In the editorial work of this section Captain **V. Nauckhoff**, Stockholm, has assisted.

1. Agriculture. Partly after information from *P. Lundell*, Ebbetorp, Member of the Riksdag . . . . . 513.

Horticulture and Floriculture (p. 544), after Director *E. Lindgren*, Tumba, and Director *Aug. P. Andersson*, Stockholm.

2. Cattle-Rearing. By Captain *V. Nauckhoff*, Stockholm . . . . . 549.

Prize-competitions of Cattle (p. 564), by *W. Flach*, Chief Secretary, Depart. of Agriculture, Stockholm.

3. Dairies and Dairy-farming. By *N. Engström*, Ph. D., Alnarp . 571.

4. Public and Private Institutions to the Advancement of Agriculture 589.

Agricultural Science (p. 590), by Prof. *H. Winberg*, Ph. D., Director of the Alnarp Agricultural High School. — Agricultural

Digitized by Google

Page.

Education (p. 593) and the Veterinary System (p. 598), by *L. Holmström*, Ph. D., Hvilan. — Agricultural Credit Establishments (p. 598), by *V. Ramstedt*, Ph. D., Tranbygge. — Mortgage on Real estate (p. 601). — Loans and subventions for Cultivation (p. 601). — Agricultural Societies (p. 602), by Captain *V. Nauckhoff*, Stockholm. — Offices of Chemical Analysis (p. 603), by *M. Weibull*, Ph. D., Alnarp. — Offices for Seed-controlling (p. 604), by Prof. *Bengt Jönsson*, Ph. D., Lund. — The Sowing-seed question (p. 605), by Prof. *N. Hj. Nilsson*, Ph. D., Svalöf. — The Swedish Moor-Association (p. 606), Farmers' Societies (p. 608), and Agricultural Meetings (p. 609), by Captain *V. Nauckhoff*, Stockholm.

5. Agricultural Labourers. By Captain *U. von Feilitzen*, Löfvingsborg . . . . . 610.

6. Agricultural Legislation. By Judge *C. Th. af Ekenstam*, Visby, Member of the Riksdag . . . . . 615.

VII. **Forestry** . . . . . 619.

1. The Forests. By *Th. Örtenblad*, Chief Master of Forest, Umeå 619.

2. Forest Industries. By *E. Arosenius*, Ph. D., Royal Central Bureau of Statistics, Stockholm . . . . . 635.

Floating (p. 652), by *Th. Örtenblad*, Chief Master of Forest, Umeå.

VIII. **Shooting and Fishing** . . . . . 669.

1. Shooting and Shooting Legislation. By *A. N. H. Wahlgren*, Master of forest, Uppsala.

2. Fishing. By the late Dr. *R. Lundberg* . . . . . 674.

IX. **Mining Industry and Metal Production** . . . . . 681.

1. The Iron Mines (together with information regarding other mines). By the late Prof. *O. G. Nordenström* . . . . . 685.

2. The Iron and Steel Industry. By the late Prof. *J. G. Wiborgh* 706.

3. Other Minerals and Metals. By the late Lector *C. G. Särnström* 752.

4. Measures for the promotion of the Mining Industry and Metal Production . . . . . 761.

The Maps referring to the Mining Industry are drawn up by *K. Key-Åberg*, Ph. D., Actuary at the Board of Trade.

X. **Manufacturing Industries.** By *Å. G. Ekstrand*, Ph. D., Chief Engineer, Control Office of the Department of Finance . . . 763.

The following articles have their special authors, viz: The Waterfalls of Sweden (p. 772), by Lieut. Col. *P. Laurell*, Stockholm. Breweries (p. 788), by *A. Heljestrand*, Master-brewer, Gothenburg. Textile and Clothing Industry (p. 793), by Prof. *G. Sellergren*, Stockholm. Metal and Machine Industry (p. 862), by Lector *C. R. Ekstrand*, Ph. D., Chalmers' Polytechnical College, Gothenburg. The Electric Industry (p. 886), by *A. Enström*, Ph. D., C. E., Stockholm. Handicraft

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Page.

and Domestic Industry (p. 896), by *A. Raphael*, Ph. D., D. C. L., Stockholm. Industrial Art (p. 902), by Miss *Maria Hallman*, Ph. C., Stockholm. The most prominent Swedish Inventors in the domain of industry (p. 908), by *N. Rahm*, Chief Engineer, Royal Patent Office. — The Maps in this section are drawn up by *K. Key-Åberg*, Ph. D., Actuary at the Board of Trade, Stockholm.

1. Articles for Nutriment or Indulgence . . . . . 775.
2. Textile and Clothing Industry . . . . . 793.
3. Hides, Skins, and Hair . . . . . 810.
4. Oils, Tar, India-rubber, and kindred commodities . . . . . 812.
5. Timber-ware Industry . . . . . 818.
6. The Paper Industry . . . . . 829.
7. Manufactures from various Vegetable Substances . . . . . 833.
8. Manufactures of Stone, Clay, Charcoal, and Peat . . . . . 833.
9. Chemical Industry . . . . . 855.
10. Metal and Machine Industry . . . . . 862.
11. Other Industries . . . . . 886.
12. Handicraft and Domestic Industry . . . . . 896.
13. Industrial Art . . . . . 902.
14. The most prominent Swedish Inventors in the domain of Industry 908.

XI. **Commerce** . . . . . 910.

History (p. 910). — Foreign Commerce (p. 917). — Custom Legislation and Custom Staff (p. 932), by *A. Berencreutz*, Chamberlain, Swedish-Norwegian Consul General, Copenhagen. — Inland Commerce (p. 934), by *L. G. Tidander*, C. E., Stockholm. — Commercial Education (p. 936), by *A. Ahlström*, Ph. D., Principal of the Gothenburg Commercial College.

XII. **Shipping and Navigation** . . . . . 941.

History (p. 941). — Shipping in general (p. 943). — Shipping between Sweden and foreign countries (p. 944). — Swedish Vessels in Foreign Shipping (p. 949). — Home Navigation (p. 952), by Captain *G. Wallenberg*, Stockholm, Member of the Riksdag. — Canals (p. 954), by Lieut. Col. *P. Laurell*, Stockholm, and Major *G. Nerman*, Uppsala. — Harbours and Docks (p. 960), by Major *G. Nerman*, Uppsala. — Pilots and Lighthouses, Maritime Life-Saving Establishments (p. 961), and Salvage and Diving Work (p. 964), by *E. Smith*, Pilot Captain, Stockholm, Member of the Riksdag. — Navigation Schools (p. 966), by Captain *S. Björling*, Manager of the Navigation School in Malmö. — Maritime legislation (p. 967), and Dues of shipping (p. 970), by *A. Berencreutz*, Chamberlain, Swedish-Norwegian Consul General, Copenhagen. — The Sailors (p. 972), by *A. Raphael*, Ph. D., D. C. L., Stockholm, *H. Burström*, Actuary at the Royal Central Bureau of Statistics, and Captain *Hj. Gulda*, R. N., Stockholm.

Digitized by Google

Page.

XIII. **Internal Communications** . . . . . 976.

1. The Railroads. By *G. Welin*, Bureau Director, State Railway Board . . . . . 976.
2. Town Communications . . . . . 993.
3. Country Roads. By *J. P. Velander*, Ph. C., Stockholm . . . 995.
4. Postal Service. By *R. Lundgren*, Actuary at the General Post Office 1001.
5. Telegraph Service. By *C. Lundgren*, Amanuensis at the Board of Telegraphs, Stockholm . . . . . 1006.
6. Telephone Service . . . . . 1010.

The State Telephone (p. 1011), by *C. Lundgren*, Amanuensis at the Board of Telegraphs. — Private Telephone Companies (p. 1015), by Rev. *I. Kiellman-Göranson*, Stockholm.

XIV. **Credit and Insurance Establishments** . . . . . 1021.

1. The Royal Mint . . . . . 1021.

The Assay Office (p. 1023), by *K. A. Wallroth*, Comptroller at the Assay Office, Stockholm.

2. Banking . . . . . 1024.
3. Mortgage Establishments . . . . . 1032.
4. Savings Banks. By *I. Flodström*, Actuary at the Board of Trade 1033.
5. Insurance. By *J. Leffler*, Ph. D., Stockholm . . . . . 1040.

XV. **Synopsis of Industrial Legislation.** By *A. Berencreutz*, Chamberlain, Swedish-Norwegian Consul General, Copenhagen . 1050.

Patents (p. 1056), Trade Marks (p. 1058), and Designs and Models (p. 1059), by *N. Rahm*, Chief Engineer, Royal Patent Office, Stockholm.

XVI. **Labour Legislation and Social Statistics** . . . . . 1062.

1. Labour Legislation. By *A. Raphael*, Ph. D., D. C. L., Stockholm 1062.
2. Social Condition and Social Statistics . . . . . 1078.

Introduction (p. 1078). — The Co-operative Movement (p. 1081), Workmen's Dwellings (p. 1084), and the Question of Own Homes (p. 1090), by *G. H. von Koch*, Editor, Stockholm. — Sick-Relief and Burial Funds (p. 1091), and Pension Funds (p. 1094), by *H. Burström*, Actuary at the Royal Central Bureau of Statistics. — Benevolent Institutions, Endowment Funds, etc. (p. 1097). — Private Social Activity (p. 1098), by Miss *Gerda Meyerson*, Stockholm, partly after information given by Mrs. *Anna Hierta-Retzius*, Stockholm, and *A. Ramm*, City Auditor, Gothenburg.

Appendix, p. 1107. — **Index**, p. 1110. — **Errata**, p. 1142.

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To the Reader.

The Weights and Measures employed in the present volume are those of the **Metric System.** Thus: — A *meter* = 3·281 Eng. feet. A *kilometer* = 0·621 Eng. mile. An *hectare* = 2·47 acres. A *sq. kilometer* = 0·386 sq. mile. A *cubic meter* = 35·32 cubic feet. A *liter* = 0·2201 imp. gallon = 0·2642 winch. gallon. A *hectoliter* = 22·01 imp. gallons = 26·42 winch. gallons. A *kilogram* = 2·204 lbs. A *hectogram* = 0·2204 lbs. A *quintal* = 100 kilograms = 220·4 lbs. The *ton* used is always the metric ton = 1,000 kilograms = 2,204 lbs. A *register ton* = 100 Eng. cubic feet.

The Swedish monetary unit is the **Krona** (plur. Kronor) of 100 *öre*. The Swedish Krona is equal to 1·10 shilling or 0·268 dollar. It also corresponds to 0·667 Dutch Guilder, 1·125 German Mark, 1·32 Austrian Krone, 1·39 Franc, and 0·52 Russian Rouble.

By **Western Europe** is invariably meant the Germanic and Romanic countries of our part of the world, inclusive of Finland. By **Eastern Europe** is meant Galicia and Bukowina, Hungary, Russia (exlusive of Finland), and the Balkan peninsula.

The proportion **per cent** is marked %, that of **per mille** ‰. A period of many years is indicated by the first and the last year of the period, separated by an oblique line. The years given after the name of a person are those of his birth and death. An horizontal line between two years indicates that these years (financial, school years, etc.) do not coincide with the calendar year.

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I.

PHYSICAL GEOGRAPHY.

The Kingdom of Sweden occupies the eastern, and larger, section of the *Scandinavian Peninsula*, situated in North-Western Europe. The western, and smaller, section of the peninsula consists of the Kingdom of Norway, which is politically united with Sweden under one monarch. Of the total area of the united kingdoms — about 770,000 sq. kilom. — **448,000 sq. kilom.**, or approximately 58 %, belong to Sweden*. Of their total population — rather over 7 millions — upwards of **5 millions**, or about 70 %, are resident in Sweden.

Sweden and Norway form a political unit, which, in respect to *extent*, stands second in Europe, the Russian Empire alone being larger. Even Sweden by itself, covering as it does 4·57 % of the area of Europe, is one of the larger countries of that continent. It is a little smaller than either France or Germany, but is, on the other hand, nearly half as large again as Great Britain and Ireland. In respect to *population* Sweden and Norway cannot, of course, bear comparison with the Great Powers, though among countries of second rank their united inhabitants are only outnumbered by those of Spain. In Sweden alone there are about as many people as in the Netherlands; it comes, therefore, after Belgium, but surpasses Switzerland, for instance, by about 60 %.

Owing to its very northerly situation the Scandinavian Peninsula is, as a whole, thinly populated, though less so than any other land of the same latitude. The southernmost parts of Sweden are comparable to Central Europe in respect to state of culture and density of population.

Sweden is bounded by the sea on the east, the south, and partly on the west — the waters being: the Gulf of Bothnia, the Baltic Sea, the Sound, the Kattegat, and the Skagerack. The sole land-boundaries are those dividing it from Finland and from Norway. The remarkable degree of ethnographical uniformity possessed by Sweden as a nation is paralleled, in a measure, by the notably advantageous character of its boundaries as a geographical and political unit. Exception must, however, be made in regard to the Finnish frontier, for that is con-

* A sq. kilom. = 0·386 sq. mile.

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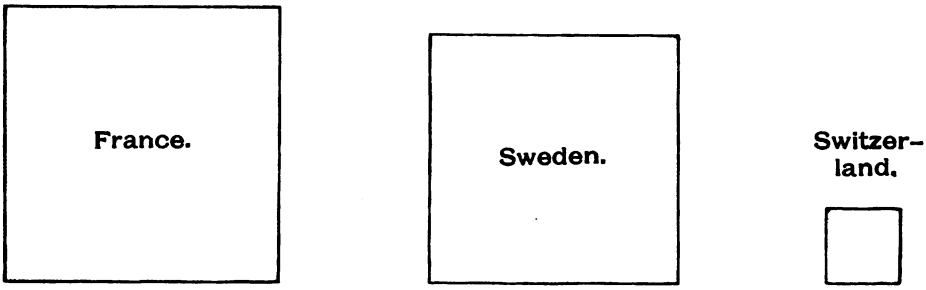
Area of Sweden, compared with area of France and Switzerland.[1]



stituted by rivers, and a river, owing to the facility of communication from one bank to the other, may be deemed rather to unite than sunder the countries on either side of it. As a matter of fact, previous to the year 1809 the Finnish frontier lay considerably east of its present position, away from rivers, the whole of the valley of the river Torne being then Swedish territory.

The extent of Sweden may be more definitely stated as being between 69° 3′ 21″ and 55° 20′ 18″ N. Lat. and between 11° 6′ 19″ and 24° 9′ 11″ E. Long. of Greenwich. The latitude of the Stockholm Observatory is 59° 20′ 34·0″, of that of Uppsala 59° 51′ 29·4″, and of that of Lund 55° 41′ 51·6″; the differences of time from that of Greenwich are: for the Stockholm Observatory 1 hour 12 min. 13·99 sec.; for that of Uppsala 1 h. 10 min. 30·15 sec.; for that of Lund 0 h. 52 min. 45·01 sec.

The *length* of Sweden from north to south is about 1,600 kilom.[2] Its greatest *breadth* is about 400 kilom. Strelbitsky calculated the *boundary-line* to measure 9,817 kilom., 7,624 kilom. of which is coast-line, 536 kilom. Finnish frontier, and 1,657 kilom. Norwegian frontier. It is, however, clear that all such computations must be largely dependent upon the extent to which the indentations of the coast-line are regarded, and cannot consequently lay claim to anything but an approximate accuracy.

The *area* of Sweden, according to the most recent ordnance survey, amounts to 44,786,227 hectares; this figure, however, will doubtless be slightly altered as a result of the mappingwork still in progress. Strelbitsky estimated the area of Sweden, in the year 1882, at 45,057,530 hectares. The difference between this and the above figure, it will be seen, is but trifling.

The **boundary-line** between *Sweden* and *Norway* for by far its greatest extent — from the far north to the northern part of Vermland — is really a natural boundary, that has its course among the pathless mountains which, being the highest part of the peninsula, form its chief watershed. The southern portion, on the other hand, has an historical basis, and along its length lively intercourse has at all times been carried on between the inhabitants of the two countries; moreover, the actual course of the boundary has been repeatedly moved in the past, now to the advantage of one country, now to that of the other. The *Finnish* frontier is constituted by the main channels of the rivers Köngämä, Muonio, and Torne. At Haparanda a piece of Finnish territory has come to be joined to Sweden, by reason of an alteration that has occurred in the bed of the river.

[1] A sq. kilom. = 100 hectares = 0·386 sq. mile. — [2] A kilom. = 0·621 statute mile.

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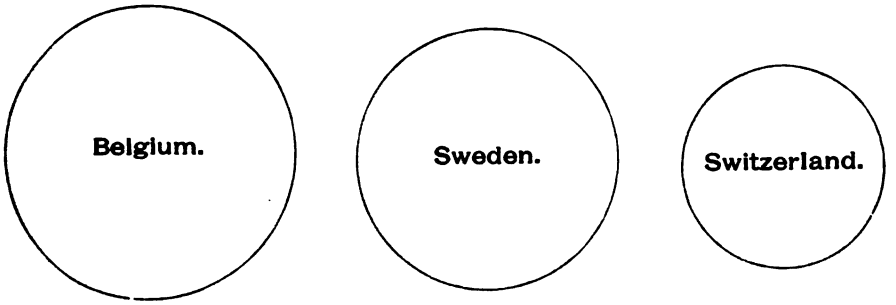
Population of Sweden, compared with population of Belgium and Switzerland.



6,750,000 inh. 5,140,000 inh. 3,300,000 inh.

Like most other countries, Sweden is differently **divided** from an administrative and an historical point of view. The old historical division into **provinces** is shown on the map p. 4. As this division is yet of importance in the general conception, the area and population of the provinces in 1900 may here be stated.

Provinces.	Sq. kilom.	Population.	Provinces.	Sq. kilom.	Population.
Uppland	12,848	484,000	Vestergötland	18,587	630,000
Södermanland	8,990	312,000	Bohuslän	4,508	163,000
Vestmanland	8,908	177,000	Dalsland	4,196	73,000
Nerike	4,347	120,000	Gestrikland	4,445	94,000
Vermland	20,006	269,000	Helsingland	15,529	144,000
Dalarne	30,792	219,000	Herjedalen	12,858	11,000
Östergötland	11,054	279,000	Jemtland	37,015	99,000
Småland	30,642	552,000	Medelpad	7,238	94,000
Öland	1,346	30,000	Ångermanland	20,952	152,000
Gotland	3,158	53,000	Vesterbotten	16,068	97,000
Blekinge	3,015	146,000	Norrbotten	27,404	107,000
Skåne	11,274	628,000	Lappland	118,652	61,000
Halland	4,921	142,000	The four large lakes	9,109	—

The boundaries of the provinces being somewhat differently determined, the above figures are only approximative. Of the population of the city of Stockholm, 90,000 are here counted to Södermanland and 211,000 to Uppland.

On the map referred to above, the three main sections af Sweden: **Svealand, Götaland,** and **Norrland,** are also given. The area of Norrland amounts to 261,104 sq. km.; that of Svealand to 84,947 sq. km.; and that of Götaland to 92,702 sq. km. To obtain the entire area of Sweden, the extent of the four large lakes in Central Sweden, which is not ordinarily included in the area of the surrounding provinces, must be added to the above figures.

In the matter of the **Swedish geographical names,** these are given in the maps reproduced in this work, and ordinarily also in the text, in *their Swedish form.* Thus we have written Skåne, in the Swedish way, instead of Scania; Dalarne, instead of Dalecarlia; etc.; however, the English name »Gothenburg» is here used instead of the Swedish name Göteborg.

As regards the most ordinary **geographical expressions,** we may direct the reader's attention to the fact that *elf* (with the definite article, elfven; plural: elfvar, def. elfvarna) = rather large river; *ström* = smaller river; *sjö* (with the article: sjön; plural: sjöar, def. sjöarna) = lake, or, in the case of salt waters, = sea; *berg* = mountain; *dal* = valley; *land* = country; *ö* = island; *holme* = islet; *vik* = gulf, or bay; *sund* = strait, or sound; *halfö* = peninsula, etc.

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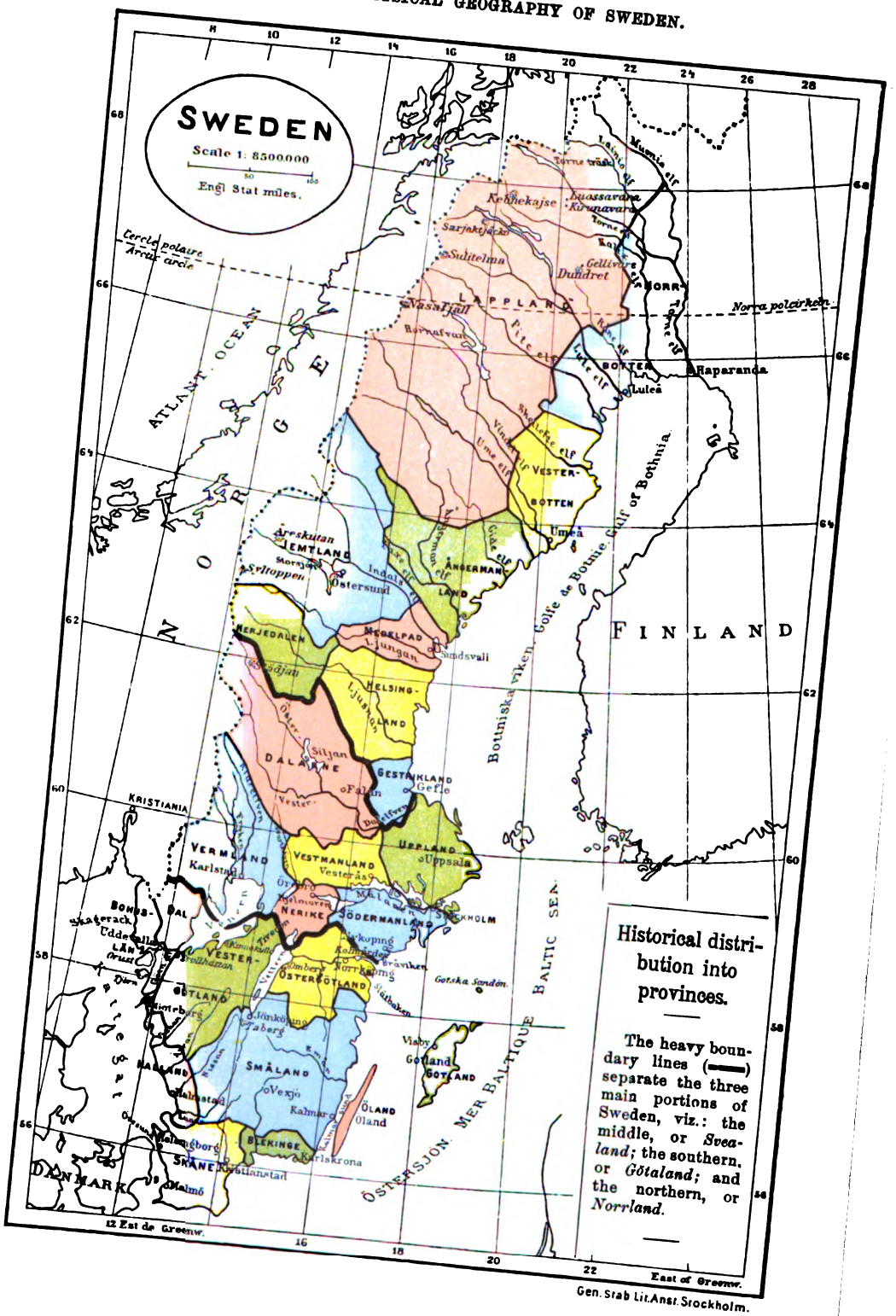

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1. CONFIGURATION AND WATER-SYSTEM.

The backbone of the Scandinavian peninsula consists of a prehistoric **mountain-range,** which was thrown up in a remote geological period along the N.E. boundary of the Atlantic Ocean. This upheaval in the Earth's crust can be traced from North Ireland, across N.W. Scotland to the Scandinavian Peninsula, where it is first visible in the Norwegian mountains, stretching from Stavanger to the frontier in North Dalarne and Herjedalen, and thence along the frontier itself in a broad belt, embracing sections of both countries, until it reaches the immense mountain-tarn, the Torne Lake, whence it vanishes into the ocean, to appear once more along the western coast of Spitzbergen.

This elevated range of country, running principally in a direction from N.N.E. to S.S.W., has been the determining factor in the geography of Sweden through a long series of geological epochs. Down from the watershed of the interior of the mainland in its original extent, water found its way to the extreme edge, thereby shaping the mighty and characteristic river-valleys of *Upper Sweden.* Owing to a series of disruptions, proceeding chiefly from N. to S. and from W. to E., large areas of the country at a later period of its geological history were depressed below their original level. That was the origin of the Baltic, the Gulf of Finland, and the large lakes and plains which are found in the *Lowlands of Central Sweden.* South of the last-named there still exists a relic of the ancient continental plateau in the *Småland Highlands,* bordered on the South by the *Plains of Skåne*; the latter are characterized by more recent, sedimentary formations, productive of natural features far removed in character from those of the Scandinavian-Finnish archæan rocks. The four regions named constitute the main orographical subdivisions of Sweden; it is proposed to give here a brief survey of each of them in turn.

A) **The Highlands and Alpine District of Upper Sweden.** This embraces by far the greater part of the country, inasmuch as it must be considered to include, not only the whole of Norrland, but also Dalarne and Vermland, and the north part of Dalsland. It should, however, be noted, that the *coast-district* in North Sweden bears a strong resemblance in physical features to the Lowlands of Central Sweden.

One of the chief physical features in North Sweden is the marked contrast between the numerous river-valleys, which in comparison to their length are remarkably large, and which flow through the country in a general direction from north-west to south-east, and the extensive mountainous and forest-clad territory that intervenes between them. The names of the twelve most important rivers are given in Table 1.

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TABLE 1. *Main rivers of upper Sweden.*[1]

River.	Length. Km.	Drainage-area. Sq. km.	Fall.[2] Meters.	Water flowing off.[3] Cub.m.	River.	Length. Km.	Drainage-area. Sq. km.	Fall.[2] Meters.	Water flowing off.[3] Cub.m.
Torne elf[4] ...	375	40,650	345	460	Ångermanelfven	389	32,620	582	430
Kalix elf[4] ...	335	18,050	497	350	Indalselfven	316	26,230	419	350
Lule elf.....	310	25,120	429	325	Ljungan	271	12,880	562	170
Pite elf.....	308	11,770	541	210	Ljusnan	370	19,590	868	265
Skellefte elf	330	11,880	482	220	Dalelfven	455	28,930	791	365
Ume elf.....	381	26,970	520	365	Klarelfven.....	367	11,870	626	200

Between the valleys of the rivers above mentioned, which can be followed right up into the heart of the Scandinavian alpine district, there are also a number of less considerable streams and rivers that take their rise in the wooded districts near the coast.

Mt. Åreskutan.

Although the dissimilarity in character between the river-valleys on the one hand and the intervening high lands on the other is very manifest, the uniformity of both the former and the latter throughout

[1] According to a report of O. APPELBERG. A meter = 3·281 feet. A cub. meter = 35·32 cubic feet. A sq. kilom. = 0·386 sq. mile. — [2] From the springs to the mouth. — [3] The average amount of water flowing away per second. — [4] Of the drainage-area of the Torne elf only 26,500 sq.km. belong to Sweden, and the rest to Norway and Finland. The water flowing away through Tärendö- to Kalix-river averages about 100 cub.m. per second.

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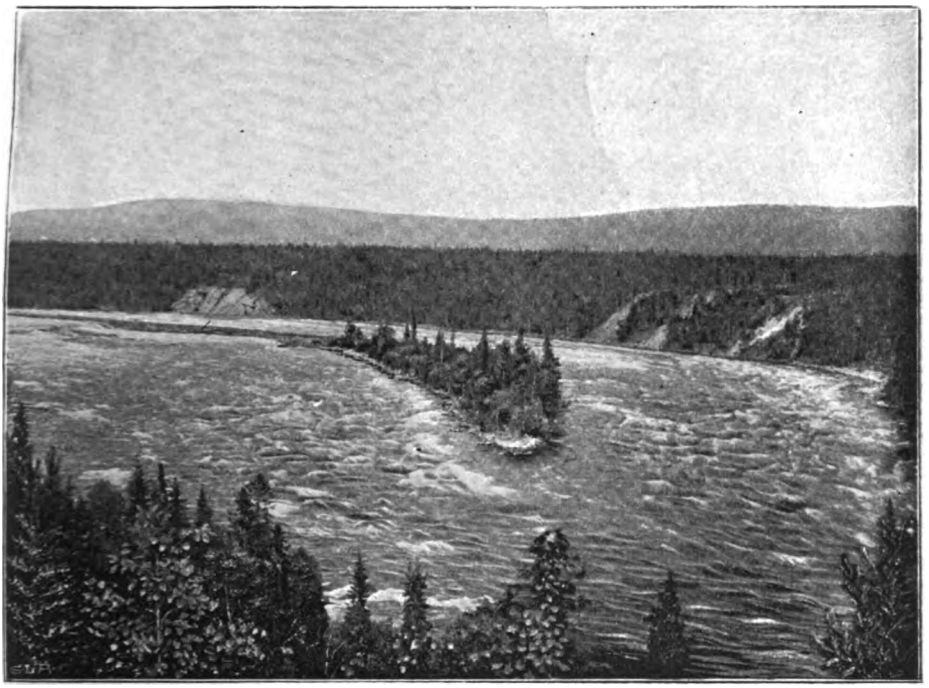
the different parts of North Sweden is none the less marked. That *is*, however, far from being the case, if a comparison be made at *different* latitudes on traversing the country from east to west. Three belts running in the direction of the greatest extent of the country may be easily distinguished: furthest west, mountains and a series of great lakes; then a morainic and marshy district; and finally a region covered by quarternary marine deposits. These belts pass into one another, it is true, but are nevertheless, in general, clearly defined.



Valley of the Lule elf at the Porsi Rapids.

a) **The Mountain and Lake Belt.** The Swedish mountains constitute, as has above been shown, one section of an extensive chain, that occupies a part of Sweden contiguous to the Norwegian frontier, about 100 kilom. in breadth and extending from the utmost extremity of the country in the north down to the northernmost part of Dalarne. The district was in ancient times designated by the name *Kölen*, and is so still, though that name has sometimes been incorrectly used to include also the borderland between the two countries further south. The limits of the alpine district to the East are in many places very clearly marked, the mountains often rising sheer from the wooded tracts east of them. By reason of its great age, geologically, the Swedish chain of mountains differs in several particulars from those of Central and

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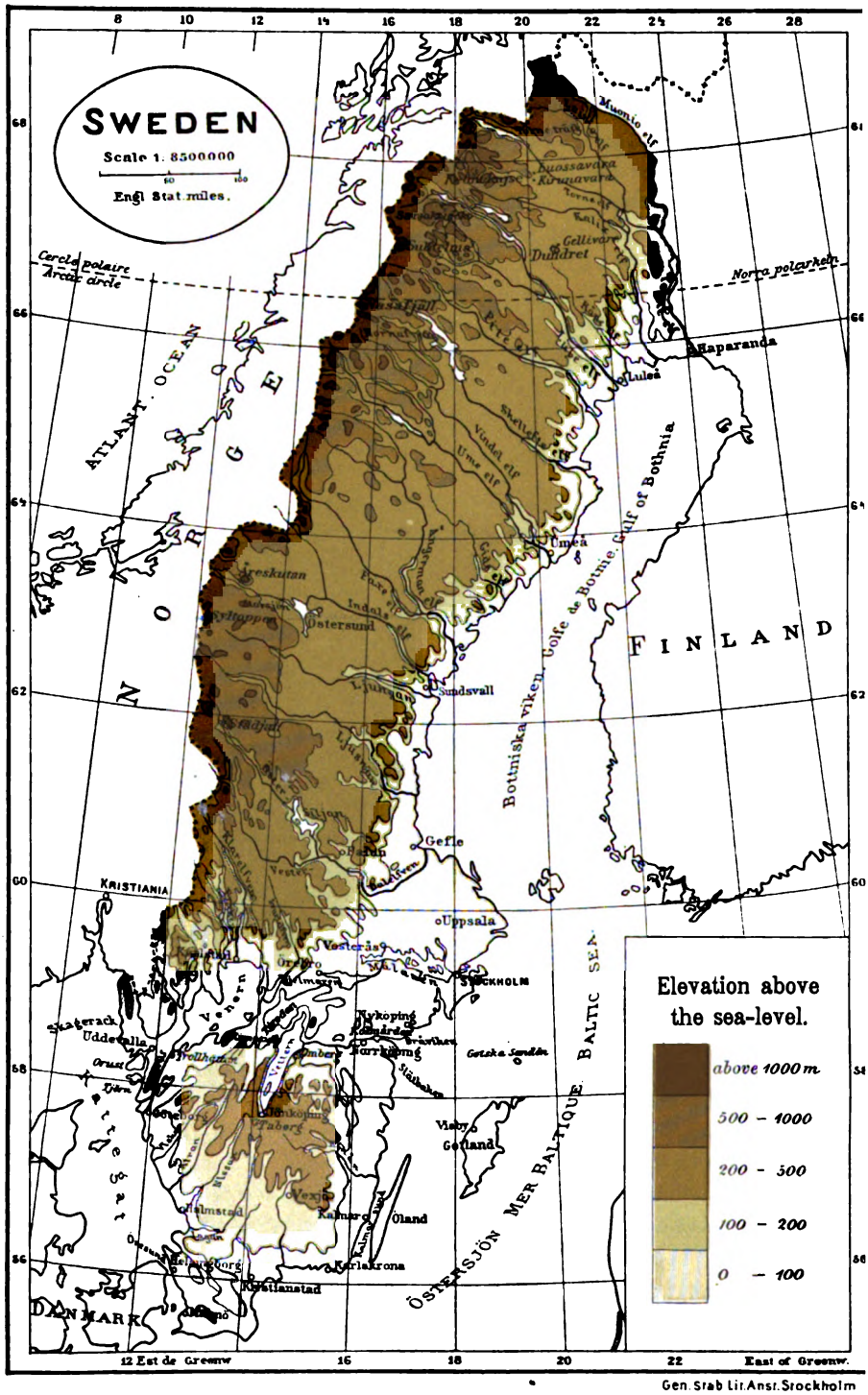

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Southern Europe. Thus, the peaks of even the highest of the Swedish mountains have, in general, a rounded form (cf. for instance, the figure of Åreskutan, p. 6), this being principally due to the fact that here erosive and destructive forces have had a vastly longer period for the prosecution of their work than has been the case, for instance, in the Swiss Alps. The protracted period during which the land was under ice in the Glacial Epoch is another contributory cause. Only a few peaks here and there, consisting of some specially hard and unyielding material, mostly of an eruptive nature, have been capable of retaining down to the present day that boldness of outline which is generally regarded as characteristic of a mountain-top; this is the case with the peaks named the *Sylarne* in South Jemtland, and with the numerous peaks of the *Sarjeksfjällen* and those near the *Kebnekaise* in North Lappland. Another peculiarity of the Swedish mountains is that they are intersected by immense and very deep river-valleys, dividing the range into distinct rock-masses; so marked are these divisions, that it was reserved for the geological researches of the last few decades to discover that these separate masses originally formed one great mountain-chain. A noticeable difference exists in the character of the river-valleys on the two sides of the watershed; whereas the rivers in Sweden descend slowly in extensive depressions towards the sea, those in Norway flow in deep and narrow gorges, and carry their waters down to the ocean in the space of comparatively few miles.

TABLE 2. *Distribution of the surface of Sweden according to height above the sea level.**

Between the latitudes.	Total surface. Sq. kilom.	Whereof (sq. kilometers) at a height above the sea level of				In percent.			
		more than 400 meters.	400—200 meters.	200—100 meters.	under 100 meters.	More than 400 m.	400—200 m.	200—100 m.	Under 100 m.
69—68°	13,800	8,690	5,110	—	—	63·0	37·0	—	—
68—67	34,040	18,500	12,900	2,640	—	54·3	37·9	7·8	—
67—66	41,880	17,330	10,660	7,800	6,090	41·4	25·5	18·6	14·5
66—65	41,160	14,460	17,070	3,130	6,500	35·1	41·5	7·6	15·8
65—64	39,540	6,050	25,790	4,570	3,130	15·3	65·2	11·6	7·9
64—63	33,720	9,400	11,780	6,850	5,690	27·9	34·9	20·3	16·9
63—62	32,960	11,510	13,170	3,940	4,340	34·9	40·0	11·9	13·2
62—61	28,800	9,810	10,790	4,210	3,990	34·0	37·5	14·6	13·9
61—60	34,350	3,000	11,240	10,120	9,990	8·7	32·7	29·5	29·1
60—59	44,340	—	800	10,480	33,060	—	1·8	23·6	74·6
59—58	38,160	—	540	5,280	32,340	—	1·4	13·9	84·7
58—57	34,930	—	6,760	15,050	13,120	—	19·4	43·0	37·6
57—56	24,320	—	580	11,070	12,670	—	2·4	45·5	52·1
56—55	5,860	—	—	400	5,460	—	—	6·8	93·2
Total	447,860	98,750	127,190	85,540	136,380	22·0	28·4	19·1	30·5

* After Mr O. APPELBERG's approximate calculations. A meter = 3·281 feet = 1·094 yard. A sq. kilometer = 0·386 sq. mile.

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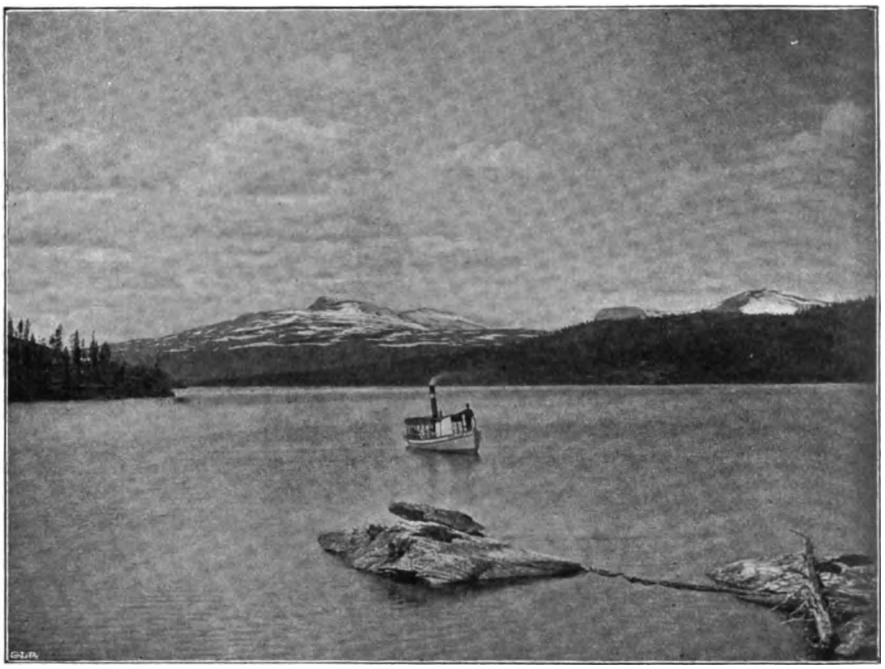

Lake Anjan in Jemtland. Mt. Anjeskutan (in the background).

The following are the most important of the Swedish mountain groups, pro ceeding from north to south. The Kebnekaise system, south of the Torne Lake the peak itself towers aloft from among the adjacent heights, the highest in a Sweden, 2,135 meters in altitude. South of the upper main valley of th Lule elf are found the numerous peaks of the groups: Sarjeksfjällen, Ålkas fjällen, and Pårtefjällen; this group is perhaps the grandest section as regard mountain scenery, having numerous and extensive glaciers and well-nigh in accessible summits, such as: Sarjektjåcko 2,125 m., Ålkasfjället 2,010 m., the loft est peak of the Skuorka 2,019 m., Pellorippe 2,025 m., and Tjäura 2,042 n As is often the case in one range of mountains, the altitudes here display remarkable uniformity, a circumstance that points to a common origin. Furthe westwards the summits do not rise quite so high, the peak of Sulitelma, formerl supposed to be the loftiest point in Sweden, only attains an altitude of 1,877 n Southwards too the summits decrease in height. South of the upper valley o the Pite river there is a summit called Kuostertjåcko, 1,694 m. high, while th peaks in the vicinity of the northern tributaries to the Skellefte and Ume river do not exceed from 1,600 to 1,700 m. Stuorevare, however, situated in the grou known as the Norra Storfjället, on the bank of the principal tributary of th Ume river, has a height of 1,764 m. The mountain regions south of that hav been as yet but little explored, but the summits hardly seem to attain a greate altitude than 1,200 or 1,400 m. Thus, of the better known ones, Åreskutan 1,419 m. and Anjeskutan 1,199 m.; south of the Åre valley there is a very ex tensive mountain region, with Storsylen (1,762 m.) and Helagsfjället (1,797 m as its highest summits. At this point in its course the range turns westward towards Norway. The southernmost limit of the mighty chain is constituted b the majestic masses of quartzite in Herjedalen and North Dalarne; here the chi

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summits are: Hundshögen (1,371 m.), on the borders of Jemtland, Serfjället (1,172 m.), Sonfjället (1,277 m.), Städjan (1,176 m.) and Herjehågna (1,155 m.). South of the last-named, the Faxefjäll and the Fulufjäll extend in a south-easterly direction to Lima, forming an elevated plateau-region, with highest altitude about 1,000 m. above sea-level.

The North-Swedish mountain chain is intersected, as has been pointed out, by a number of valleys. These valleys, owing to the character of the rocks through which the rivers have had to make their way, are either, as in the majority of cases, wide and gently sloping, or else resemble gorges, with more or less precipitous walls. In the former case the valleys are partially occupied by lengthy lakes, whose origin is to be traced in changes of the old preglacial river-courses caused by the Glacial Period. The valleys cut in the rocks by the rivers were at that time frequently dammed up by immense masses of morainic and fluvio-glacial material; moreover, it is possible that an uneven upheaval of the land may have brought about changes in the water-courses. As the watershed lay at an elevation of from 400 to 800 m., there was no possibility of outflow to the west, and hence the origin of the lakes. The great Norrland lakes, that are so characteristic of the landscape, have many features which are common to them all. Thus, they are all situated at elevations only varying by some 100 m.; their greatest depth is, as a rule, at the western end, where also their character of rock-tarns is most in evidence. The chief of these lakes, proceeding from N. to S., are*:

Lakes.	Height over sea-level. Meters.	Area. Sq.km.
Torne Lake	345	326
Langas-Stora Lule Lake	375—370	227
Saggat-Skalka	303—295	83
Hornafvan-Storafvan	425—419	713
Storuman	348	166
Vojmsjön	413	78
Malgomaj-Volgsjön	341—333	104
Flåsjön	265	130
Ströms vattendal	286	96
Hotagen	313	50
Kallsjön	381	151

The rocks in the upper portions of the mountain chain are, in general, quartzites and hard eruptive species, such as diorites and diabases, whereas softer varieties, such as mica-schist and other schists, appear very largely in the valley-courses and in the lower regions. Along the eastern limit of the mountain region are to be found unmetamorphosed Silurian schists, limestones, etc.; this zone attains its greatest breadth in the fertile and extensive plains of Jemtland.

Very considerable sections of the mountain regions, such as those about Kebnekaise, Sarjek, and Sulitelma, are occupied by *Glaciers*. The most southerly glacier in Sweden is the small one in the more northerly of the basin-shaped valleys near the Helagsfjället, 62° 54′ 19″ N. Lat., and 5° 36′ 3″ W. Long. of Stockholm. In other places the covering of the mountains is that of an alpine moorland, consisting of lichens,

* A meter = 3·281 feet = 1·094 yard. A sq. kilom. = 0·386 sq. mile.

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mosses, and a few flowering plants; only in spots that are copiously supplied with moisture does a richer and more varied flora appear. On the mountain-sides the birch (Betula odorata) struggles to exist; in the southern parts it is almost everywhere closely followed by the spruce (Picea excelsa), while in the northern parts it grows over vast regions alone, or, lower down, sparsely mingled with pines (Pinus silvestris). The possibilities of cultivating the soil of the lower parts of these mountain regions (say up to 600 or 800 m.) are far greater than might be supposed; this is due to the immense stretches of fine, fertile sand or clay which were deposited during the later portion of the Glacial Period in the large, ice-locked lakes then filling the greater part of the valleys. It is in these stretches that the cultivated districts are now mostly to be found.

The Indalself, in Medelpad.

b) **The Morainic and Marshy Belt.** This region almost wholly coincides with the area marked on the orographical map on p. 8 as lying at an altitude of between 200 and 500 meters. The river-valleys are much shallower here than in the mountain region last described. This is especially the case in the north and as far south as the Lule river, including the district from Gellivare to Luossavara, where a railway is now being constructed; in that district plains of many miles in extent prevail, the rivers winding their courses over them, and here and there a hill with long and gradually sloping sides rising from their surface

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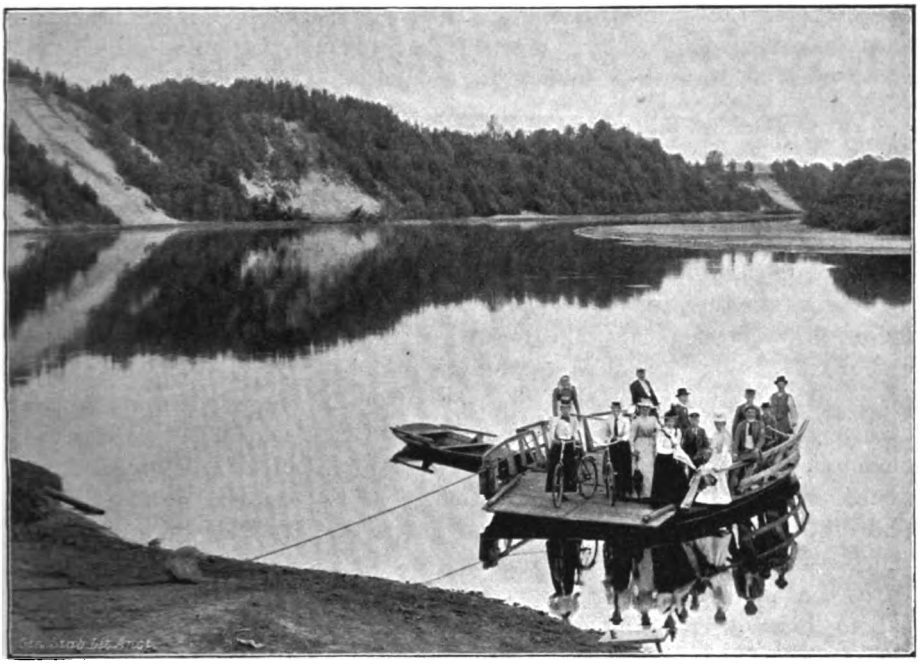
to the height of some few hundred feet. It is here that the famous Lappland iron-ore deposits are to be found, in the hills at Gellivare, Luossavara, Kirunavara, and other places. Further south hills are more numerous, rendering the surface more broken in character; the highest peaks attain an elevation of from 500 to 600 meters above sea-level.



The Klarelf at Ekshärad in Vermland. Photo. DAVID HOLMQVIST.
The river-bed has forced its way down through the vast marine deposits, whose boundary is seen in the background.

The ground throughout the belt in question has approximately the same appearance as at the close of the Glacial Epoch. The ancient morainic deposits are spread like a coverlet over the original rock, which consists of varieties of gneiss, granite etc.; peat-mosses are almost the only recent formation to be found. The morainic districts are stony in character, in places so much so, that the surface consists of unworkable boulders. By reason of the hilly and uneven surface and the difficulty that moisture has in making its way through the closely packed morainic deposits, all the low-lying tracts have been liable to become flooded; this accounts for the very large number of marshes and peatmoss-covered stretches existing here. »On fine summer evenings», writes Professor HÖGBOM, »when the mists settle upon these lowlands, the heights stand out from their midst like rocky islets from the surface of a surrounding sea. The landscape displays a similar scene in winter, when the wooded heights afford a contrast to the snow-clad plains around

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them.» — A clear manifestation of the great prevalence of these peat-mosses is the brown colour of those streams (e. g. the Gide, Öre, and Råne) that take their rise here, as compared with the clear water of the great rivers that proceed from the mountains.

In the regions within this belt not subject to inundation or excessive moisture, forests grow in great abundance; indeed so extensive are the forests, that it is this region that constitutes the chief source of that wealth in timber for which Sweden is so famous, and which exercises such an influence upon the economy of the world. Pines are, in general, the most prevalent trees on drier soils and where forest-conflagrations in recent times destroyed the old timber, whereas the spruce is more plentiful in places more subject to moisture. On the peatmosses, on the other hand, no timber is found; there the ground has a covering of different species of ericaceous-plants, sphagnum, and sedge, with here and there some patches of dwarfling pines.

Save for the parts of Upper Lappland above described, where the rivers flow across plains, the typical river-valley in this belt has steep and bare banks; the landscape only assumes a more attractive appearance in the vicinity of the lakes or along the course of some isolated glen. Otherwise the aspect these forest-clad regions wear is extremely monotonous, giving the beholder the impression of a land of vast distances with scanty communications. Except in the fertile Silurian plain of Jemtland, whose surface was also partially covered with the ice-blocked lakes above described, the possibilities of cultivation with the prices of labour now prevailing are very limited. In order to escape from the destructive agency of frost as far as possible, and to obtain the best and warmest soil available, the land to be brought under cultivation has been selected on the slopes of the heights that face the south, and there hamlets, farms, and dairy-pastures may be seen, like so many oases in the endless desert of forests. In the southernmost parts of the region, in the mining districts of Dalarne and Vermland, cultivation of the soil has made greater progress, owing to the somewhat milder climate and especially to the abundance of valuable ore-deposits.

c) **The Marine-Deposit Belt.** The extent of this belt is very clearly marked in general in the river-valleys. At the base of the valleys lie wide plains, consisting of delta-land of sand or clay, deposited on the seabottom when the coast-districts were washed by the sea, at the close of the Glacial Epoch or later. In Norrbotten these marine deposits attain an elevation of about 200 meters, and extend about 100 or 150 kilom. into the interior; in Ångermanland, Medelpad, and Helsingland they are as much as 250 meters above the sea, but do not penetrate inland more than from 50 to 80 kilom., as a rule. The sea has washed away the morainic deposits of the Glacial Epoch from the summits, which consequently mostly display the naked rock, or at all events

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but a remnant of stone and gravel with all the finer material elutriated. The material thus removed from the summits was deposited on the former sea-bottom, which is now for the most part land. Such is the origin of the level and cultivated tracts now to be met with in all the river-valleys in North Sweden; they have long been seats of industrious and successful agriculture. Along the upper limit of the marine deposits extensive fields of coarse sand have for the most part been left; on them pine-trees have flourished, as the large pine-barrens of the districts testify.

Subsequent to the rise of the land-surface the rivers worked a way through the loose deposits down to their original beds on the solid rock; along the course of their banks there still remain deep cuttings through sand and clay, often some tens of meters in altitude. These cuttings are locally termed *nipor* (»Bluffs») and often assume fantastic forms, contributing in no small measure to the natural beauty of the scenery, which, especially in the valleys of the Ångerman and Indal rivers, has a justified celebrity. Another feature of the scenery of the North Swedish river-valleys, that contributes to its charm, is their fading away in blue hills lining the horizon.

The Arctic Sea of the late Glacial Epoch (the Yoldia-sea) in north western Europe.
Present coasts denoted by light lines.
(According to G. DE GEER and J. J. SEDERHOLM.)

From the Öre river in the north to beyond the mouth of the Indal river in the south, there are to be found numerous heights, some 300 or 400 (exceptionally 450) m. in altitude above the sea, extending even down to the coast. Further south the summits recede from the coast. South of the Ljusnan the highlands of Herjedalen and Helsingland approach, nevertheless, to within a few miles of the sea; the summits here are occasionally as much as 400 meters in altitude and upwards. In the marine-deposit belt the soil on the heights is, however, often shallow and dry, so that the continued regrowth of forests is more impeded than in the morainic districts further inland.

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The present coast-line in Norrland is of a temporary character, inasmuch as the upheaval of the land now going on (in the Quarken at the rate of about one meter in the century, at Stockholm of 47 centim.) causes the boundary to be constantly advancing, inasmuch as fresh tracts of sea-bottom of exactly similar nature to that just described are continually making their appearance. The valley-courses are continued under the present surface of the sea; the thousand islets and islands now forming the Skärgård, which gives the Scandinavian coasts a character of their own, are but the first signs of hills and summits of the future; the sand and clay bottoms of the bays, which slope very gradually out to sea, are the fields, which, when raised above the level of the sea, will be taken possession of by the agriculturist. In the tracts abandoned by the sea, and not immediately claimed for cultivation, coniferous-forests make their appearance, almost always preceded on the Norrland coast by a belt of speckled alder (Alnus incana), usually some tens of meters in breadth.

B) **The Lowlands in Central Sweden.** The marine-deposit district, with its plains and with its clay soil, which lends itself so well to cultivation, extends from the coast-districts of Norrland over the whole of the lowlands in Central Sweden; the dissimilarity of the two regions is, nevertheless, very great. If the elevation-curves for 100 and 200 meters be traced on the map on p. 8, and if the sketchmap p. 15 be compared therewith, it will be noticed that the immediate continuation of the Norrland coast-tract runs through the mining districts of Dalarne and Vermland, where deep valleys intervene between the more elevated moraine-covered regions of primary rock. Hence wooded ranges of heights constitute the greater part of the country, as is the case in Norrland, while in the lowlands proper the greater part of the country consists of a more uniformly level ground, as a result of the marine deposits. Out of this there rise in different parts more or less numerous heights, of varying elevation but seldom exceeding from 50 to 100 meters above the sea. Exceptions worthy of note are the Silurian mountains in Vestergötland, of which Kinnekulle is 301 m., Halleberg 148 m., Hunneberg 142 m., Billingen 298 m., and Omberg, that remnant of primitive rock still preserved on the east side of Lake Vettern, 263 m. in height. Where the summits of primitive rock have been much exposed to the regular action of waves and winds, they have usually lost their initial soil formations, and form but an indifferent habitat for forests; spruces and pines, more or less intermingled with birches and aspens, carry on a struggle for existence, largely subject to interference by man. This ground is but ill adapted for tillage.

As pointed out above, it is the depression of the basal rock along certain lines that has given rise to the lowlands of Central Sweden; subsequently came the fertilizing and levelling influence of the marine deposits that spread their covering over them. These formations afford a particularly fertile and easily cultivated soil, more especially where a plentiful admixture of lime is present, as in Uppland, Nerike, Östergötland, and Vestergötland; in former times the nobler species off oliage

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trees, such as the oak, maple, ash, lime, hazel &c., grew on this soil in sufficient plenty to form forests that encompassed the dark patches of coniferous trees on the higher ground. It was on these inviting plains that the first settlers in Central Sweden took up their abodes, cultivating the soil and laying the foundation of the Swedish nation. The considerable sections of primitive rock that were unaffected by the depression, such as the Kolmården and the ridge of heights north of Lake Vettern, gave rise to large woodland districts, which long prevented the inhabitants of the adjacent plains from amalgamating into one political unit.

Though the differences of elevation in the extensive lowlands of Central Sweden are nowhere great, yet the process of depression was sufficiently dissimilar in various parts to cause some sections to lie below the general level, thereby giving rise to the basins now occupied by lakes. Of the countless lakes some are of considerable size. From early times these lakes played an important part in facilitating intercourse between different places, the multitudinous indentations of their shores contributing in no small degree to their usefulness in that regard. The four chief lakes are*:

	Height over sea-level.	Water-area.	Greatest length.	Greatest depth.
	Meters.	Sq.km.	Km.	Meters.
Mälaren	0·3—0·6	1,163	117	64
Hjelmaren	21·0	480	61	18
Vettern	88·2	1,898	128	119
Venern	44·0	5,568	140	89

The two first named find their outlet to the sea by the short river Norrström, which empties itself, with a body of water averaging 188 cubic meters per second, into the long arm of the Baltic that reaches up to the city of Stockholm. Lake Vettern finds an outlet in the Baltic by Motala Ström, 100 kilom. in length and with a body of water averaging 93 cubic meters per second; Lake Venern pours its waters to the west into the Göta Elf, 90½ kilom. long and with a body of water at the Trollhättan Falls averaging 500 cubic meters per second, equal, it is calculated, to 220,000 horse-power; the famous rapids and falls at Trollhättan descend 32·7 meters. At the mouth of the Göta Elf is situated the second town of Sweden: Gothenburg (Göteborg).

Very remarkable features in the surface-contour of the plains of Central Sweden are the very numerous *eskers* or *kames* (åsar), which traverse the country in a N.N.W.—S.S.E. direction. These ridges are of gravel and attain considerable length; they are crested in shape and are usually wooded; their height ranges from 30 to 60 meters above the adjacent clay and sand plains; they surmount the hills of primitive rock, and are in general character unaffected by the local conditions of the country

* A meter = 3·281 feet. A kilom. = 0·621 mile. A sq. kilom. = 0·386 sq. mile.

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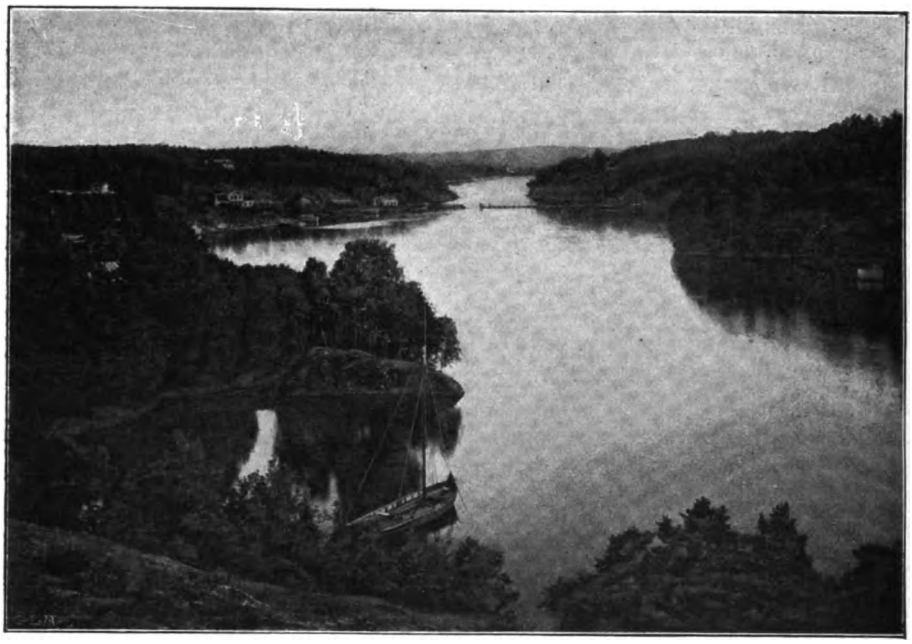
through which they pass. They are deposits of the Glacial Epoch. From a practical point of view they are of great importance as affording a plentiful supply of uniformly sharp gravel, which has been put to a large variety of uses. Similar ridges are to be found in other parts of Sweden, but in more hilly districts they do not play nearly so great a part orographically as in the plains. Such ridges are the famous Brunkebergs-åsen, in Stockholm, and the Uppsala-åsen, passing through the city of Uppsala.



On the Skuru Straits.
In the Inner »Skärgård», near Stockholm.

Like the lowlands of Central Sweden, the *coast-districts* in Bohuslän, North Halland, and Småland have also been submerged under the sea to a depth of from 60 to 150 m. (diminishing southwards). Consequently, the resemblance between those districts is very considerable. The actual coast-line is fringed with a numerous array of skerries (*Skärgård*), only terminating southwards on the east coast at Åhus and on the west near Varberg. The more favourable climatic conditions that prevail south of Uppland and the Norwegian frontier give rise, however, to a more plentiful and a more varied vegetation on those islands whose soil is sufficiently good; thus, the nobler species of foliage trees and a number of herbaceous plants flourish here (cf. Illustr. above). On this account the Skärgård in Southern Sweden wears a more varied, and often a gayer aspect than that in the North.

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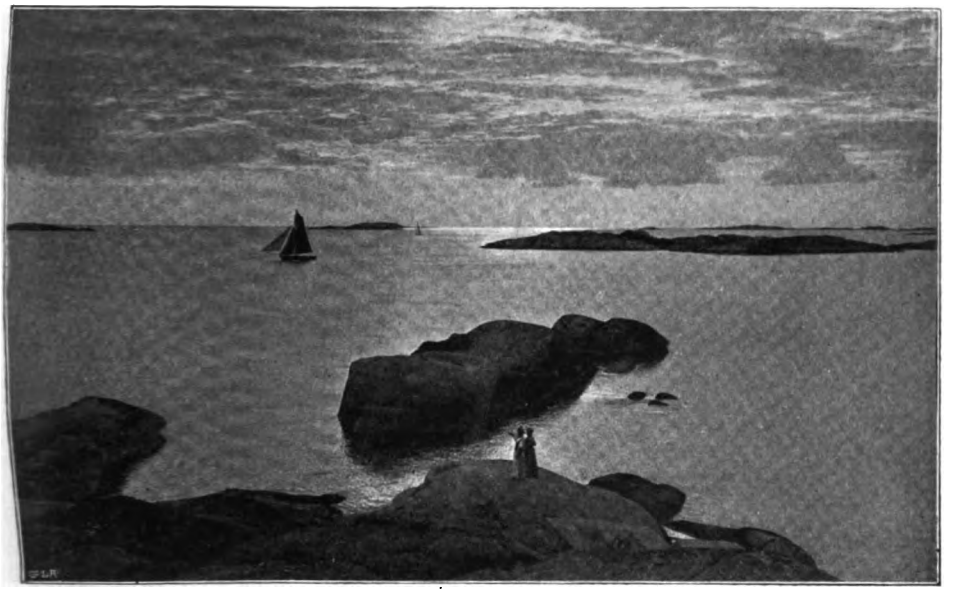
The ravages of the west winds, however, and wantonness in the care of the woods have deprived large parts of these islets off the west coast of their forests; and bare rocks, or, at best, rocks covered with a stunted growth of heather, are a characteristic feature of the scenery of this unique coast-fringe of islands and skerries.

A kind of transition from the Central Swedish lowlands to the plains of Skåne is presented by the islands of Öland and Gotland; the former has an area of 1,345 sq. kilom. and the latter of 2,959 sq. kilom. During the last phase of the Glacial Epoch both islands were under the sea entirely. Hence, the looser constituents of the soil have been



Stånge Head. Photo. M. Jacobson, Lysekil.
In the »Skärgård» of the coast of Bohuslän.

subjected to the same sorting and rearranging processes that took place in the provinces of Central Sweden, but as the basal rock consists of Silurian limestones, schists, and marls, the country has acquired quite a different character. Broadly speaking, the two islands consist of uniform plains of limestone rock, the altitudes of which vary only by some tens of meters. The layers of light, loose soil, which readily permit the penetration of moisture, together with the cold, dry springs and early summers, render the character of the vegetation much more like that of northern latitudes than one would expect from the plant-life of those localities, that are sheltered, moist, and warm. The greater part of Gotland is occupied by dry, sterile pine-forests, amidst which there occur patches of foliage trees of varied species, forming interesting oases in the otherwise uniform landscape; the main part of Öland con-

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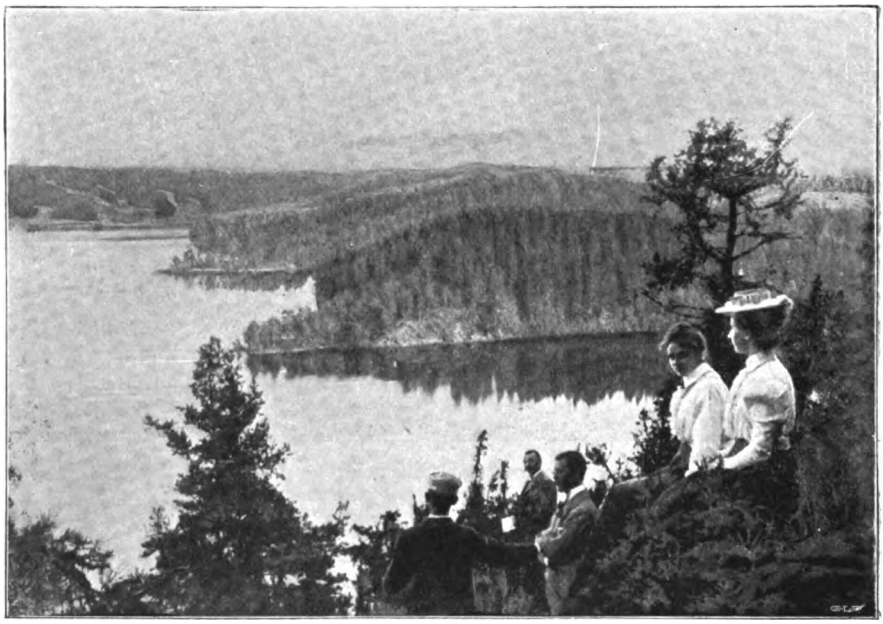
sists of limestone rock, bare of trees and resembling steppes; it has been named Alfvaret. The northern parts of Gotland and Öland and the island called Gotska Sandön present very fine sand-dune scenery.

C) From a geographical point of view, the **Småland Highlands** include all the land lying above the level of the marine deposits, not only in Småland itself, but also in South Vestergötland, Halland, North Skåne, and Blekinge. This region shows such a complete resemblance in all respects to the middle belt in Upper Sweden (that of the morainic ground and the marshes), that it is scarcely necessary to give any minute description of it. As may be seen by the map, p. 8, nearly the whole of the district lies above 100 m. in elevation, and more than half of it, chiefly in the central and eastern portions, is upwards of 200 m. high. The loftiest points are Ekbacken (358 m.) east of Ulricehamn, and Tomtabacken (377 m.) south-west of Nässjö.



At Tenhult in the Småland Highlands.

The Småland Highlands may be regarded as a direct continuation of the continental plateau of Upper Sweden, from which they are cut off by the lowlands of Central Sweden. The river-valleys are not so extensive, certainly, nor are they excavated into the primitive rock — found here too — so deeply as in Norrland, nevertheless they are of considerable size. The basal rock is almost everywhere covered by a thin morainic gravel, little adapted for agriculture; intervening between its loftier sections very extensive mosses occur. When journeying south by

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the trunk-line to Malmö, the country the traveller passes through between the stations of Osby and Nässjö is so very like that in the middle belt of Upper Norrland that he will have difficulty in distinguishing any points of dissimilarity between the two. The same wide ranges of pine and spruce, with a sprinkling of foliage trees in the vicinity of the occasional cultivated tracts, the same wearisome mosses with scattered dwarfling pines, the same succession of insignificant heights and valleys. It is only the milder climatic conditions more successful here that have rendered agriculture. Hence, to give but one example, there are far fewer hindrances than farther north to the cultivation of the large moorland districts, the damage done by frosty nights being little or nothing.

D) **The Plains of Skåne,** forming the southernmost section of Sweden, though not of great extent, are of especial importance on account of their extremely favourable natural conditions. The natural boundary, geologically, between the Scandinavian-Finnish archæan rock district and the extensive plains which border the shores of the southern section of the Baltic Sea and rest on a foundation of sedimentary formations, takes its way through Skåne. This boundary-line runs approximately in a south-westerly direction from Skelderviken in the north to Stenshufvud in the south. North of it there extends a considerable plain around Kristianstad, wholly similar in general character to the south-western and southern parts of the province. In direct connection with it, again, is that portion of the coast-district in South Halland which lies north of the Halland Ridge.

A peculiar geographical feature in the orography of Skåne is that all the ranges of higher ground run from N.W. to S.E. The chief ones are the Halland Ridge (Hallandsåsen), with highest point 226 m., Kullen 188 m., Söderåsen 188 m., Linderödsåsen 196 m., and Romeleklint 185 m. This circumstance is due to a series of dislocations that had the same course, and which can be traced in continuation on the island of Bornholm. These dislocations have brought about a depression of the deposits belonging to the Silurian, Rhactic-lias and Cretraceous systems, in such a way that they resemble in our times extensive plains at the foot of the ridges of primitive rock. The ridges subdivide the plains of Skåne into separate sections. North of Linderödsåsen the *Kristianstad Plain* stretches up towards the boundary of Småland, south of that plain and east of Romeleklint is the East Plain (*Österslätt*), passing, in the more hilly districts round Ystad, into the very fertile South Plain (*Söderslätt*), which is, indeed, the richest part of the whole of Sweden, and continuing northwards as far as to Skelderviken in the plains of western Skåne.

The general character of the plains is somewhat varied. In the neighbourhood of Skelderviken and Kristianstad, where there is a covering of recent marine deposits, the surface is almost uniformly level; in the southern districts we find, now extensive, undulating, and shallow valley-basins, separated from each other by low ranges of heights, now, as for instance to the south and south-west of Romeleklint, a very hilly country, where the morainic material has been heaped up into heights and ridges to an altitude of some 20 or 30 meters above the depressions, these being often without any outlet. The last-mentioned is the most extensively wooded tract in southern Skåne; the large beech-woods lend to the scenery a great charm, which is heightened by the luxuriant green of the meadows

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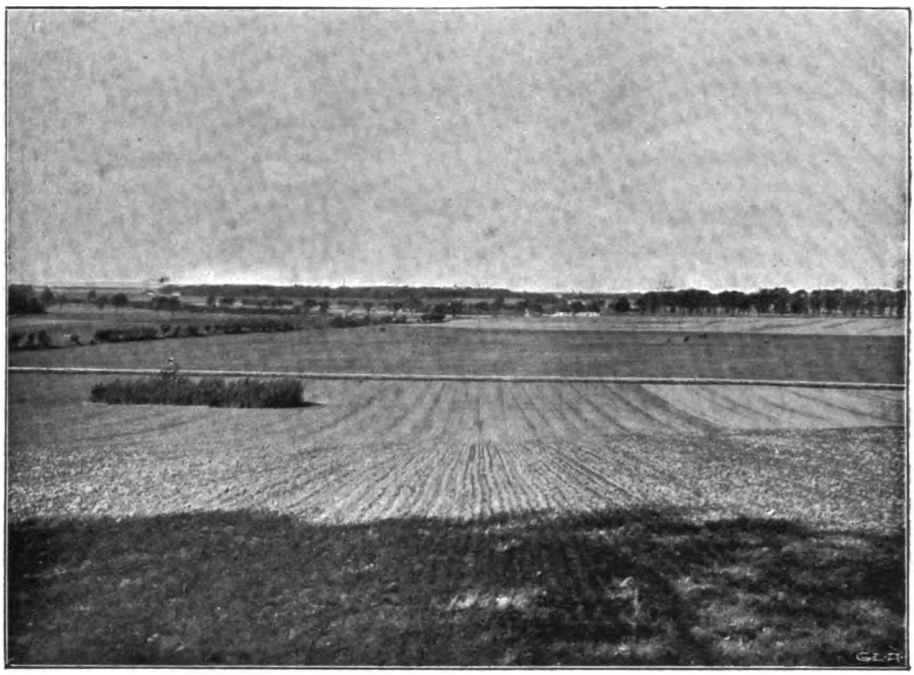
and the limpid water of the lakes. The districts lying at the foot of the slopes of Söderåsen, from Ringsjön to the coal-producing districts round Billesholm and Bjuf, present scenes of a similar character. On the other hand, in the shallower part of the plains the woods are less extensive, and the view across the vast stretches of land under cultivation is only broken by occasional farms with surrounding plantations, and by long lines of fences dividing the fields. The contrast to the rest of Sweden is further emphasized by the difference that exists in the style of building and the material used, a difference which prevails throughout. Thus, wooden structures are practically unknown in Skåne; brick, granite with other archæan stones, and clay taking the place of timber.



Near Alnarp on the Plains of Skåne.

The *coasts*, too, of Skåne are of quite a different nature from those of the rest of Sweden. The shores of Skåne, Gotland, South Halland, and Öland are the only parts of the sea-board not fringed with islets. The basal rock, with almost horizontal strata, runs out into the sea at a gentle slope, the shore being shallow and open. Upon the eastern and southern coasts of Skåne the waves can beat unimpeded and they have formed, with the aid of the wind, a series of sand-dunes, which give the landscape a picturesque appearance. On the shores of the Sound, where the force of the waves is less considerable, wind and current have spread a stretch of fine sand and clay-silt on the shallow shore, giving rise to fertile marshy meadows.

If now a general survey is desired of the effect that the natural conditions above detailed have exercised upon the development in cultural sense of the country of Sweden, a glance at the map on p. 101,

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giving the density of population, will suggest interesting comparisons. The three belts of Upper Sweden are clearly represented on this map. (The wedge of densely populated sawmill area between Hernösand and Söderhamn requires no special comment.) The favourable natural conditions in the lowlands of Central Sweden raise the density of population by one degree while it sinks again in the Småland highlands, though the less severe climate of this more southern region keeps the figure one degree higher than in the corresponding parts of Upper Sweden. The fertile plains of Skåne are the most densely populated large areas of Sweden; but even on the map referred to above, it is evident what an unfavourable influence in this particular is exercised by Romeleklint, a small district of archæan rock, which rises above the plain.

2. CLIMATE.

Of the whole area of Sweden 65,000 square kilometers, or about 15 per cent, are situated north of the Arctic Circle: the rest belongs to the temperate zone. As has already been mentioned in the foregoing pages, Scandinavia enjoys a most favourable climate considering its northerly situation. The principal reason for this is to be found in the warm seas, tempered by the Gulf Stream, which wash the coasts of Norway. This produces in the first place a peculiar distribution of the barometric pressure, causing the south-westerly winds coming from the warm seas to prevail all over north-western Europe, especially during winter, thus quite abnormally raising the winter temperature on the Norwegian coast and extending their influence even to the interior and eastern parts of the Scandinavian peninsula.

The great length of Sweden from North to South, being more than $^1/_7$ of the distance between the North Pole and the Equator, is in itself sufficient to produce considerable climatic differences, which are still more increased by two other causes. The one is that the northern part of Sweden is separated by the Scandinavian mountain-range from the warming influence of the south-west winds, the other cause is that the general height of Northern Sweden above the sea is greater than that of the southern part. As a consequence of this, the average annual temperature of the northernmost part of Sweden is somewhat below the freezing point (32° Fahr.), whilst on the southern and south-western coasts it rises to 45° Fahr. and even a little higher.

The following table gives the **average annual temperatures** (Fahrenheit), for some places in our country according to observations made (for the most part) during the years 1860/94.

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TABLE 3. *Average annual temperatures for some places in Sweden.*

Place.	Latitude N.	Height above sea-level in meters.[1]	Degrees Fahr.		Place.	Latitude N.	Height above sea-level in meters.[1]	Degrees Fahr.	
			Actually observed.	Reduced to sea-level.				Actually observed.	Reduced to sea-level.
Karesuando..	68° 26′	333	26°·6	29°·5	Strömstad....	58° 56′	9	43°·5	43°·7
Jockmock	66 36	259	29·7	31·8	Askersund....	58 53	96	41·4	42·1
Haparanda...	65 50	9	32·4	32·5	Nyköping.....	58 45	17	41·7	41·9
Piteå.....	65 19	11	34·7	34·9	Linköping....	58 25	68	43·0	43·5
Stensele.....	65 4	328	31·8	34·7	Venersborg...	58 23	54	42·6	43·2
Umeå.....	63 49	12	34·9	35·1	Skara.....	58 23	115	41·5	42·4
Östersund....	63 11	322	35·2	37·9	Jönköping....	57 47	95	42·4	43·2
Hernösand....	62 38	15	37·8	37·9	Vestervik	57 46	13	43·2	43·3
Gefle.....	60 40	13	39·7	39·9	Gothenburg..	57 42	8	44·8	45·0
Falun.....	60 36	116	39·2	40·1	Visby.....	57 39	16	43·7	43·9
Uppsala[2]....	59 52	24	40·3	40·5	Vexjö.....	56 53	168	42·3	43·7
Vesterås.....	59 37	18	41·2	41·4	Halmstad....	56 40	10	44·6	44·8
Karlstad.....	59 23	55	42·3	42·8	Kalmar.....	56 40	9	44·1	44·2
Stockholm[2]..	59 21	44	42·1	42·4	Karlshamn...	56 10	9	44·4	44·6
Örebro.....	59 16	31	41·4	41·5	Lund[2].....	55 42	38	44·6	45·0

For the sake of comparison it may be added that the average annual temperature is 48·4 F. in Berlin (central part of the city), 50·0 in London (Royal Observatory of Greenwich 1849/98) and 51·3 in Paris (central part of the city).

These figures do not, however, adequately show the climatic difference existing between the northern and southern parts of Sweden, nor between the latter and Central Europe, for the difference varies greatly with the seasons. One will get a more exact idea of the variations by studying the curves of the diagram on page 27, which show the temperature for each day of the year in London (Royal Observatory) and at three different places in Sweden on the average, for the 50 years 1849/98, viz. Lund in its southernmost part, Stockholm in its central, and Haparanda in its northernmost part. We thus find that July is everywhere the warmest month, while in London, January, but in the three Swedish cities, February is the coldest month. During the latter month the temperature in London is no less than 29·1 degrees higher than the corresponding temperature at Haparanda, the difference in July being only 4·7 degrees. As to Stockholm, its February temperature is 14·4 degrees below that of London, whilst the July temperature in the English capital is 63·7 and in Stockholm 62·4 degrees. Thus we see that the summer in our northern country, though short, is not much inferior to that of southern England in respect to the degree of heat. This fully explains why it is possible in Sweden to carry on agriculture successfully even north of the Artic Circle, where the average temperature of the year is below the freezing-point.

[1] A meter = 3·281 feet. — [2] At the Observatory.

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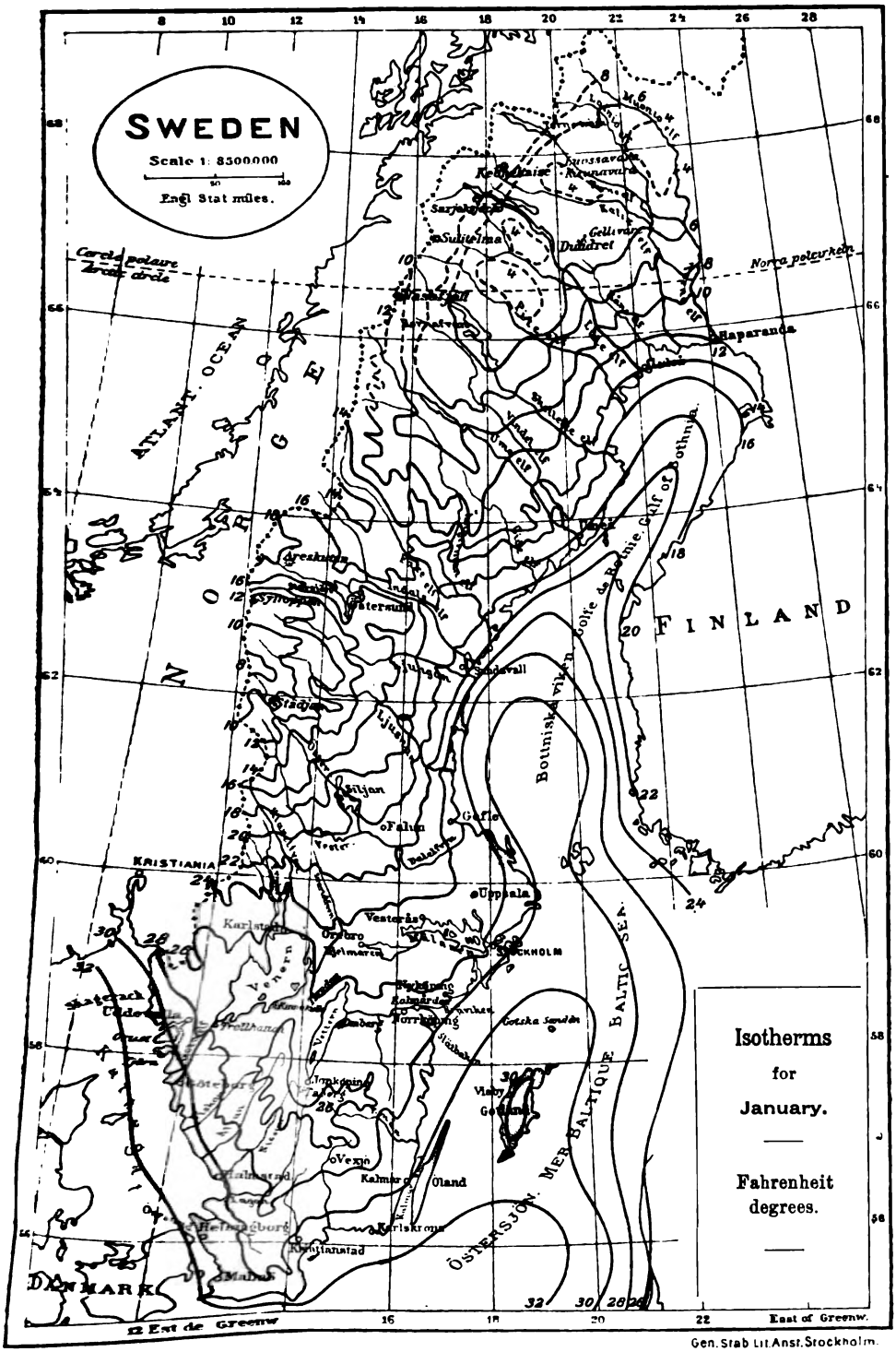

Gen. Stab Lit. Anst. Stockholm.

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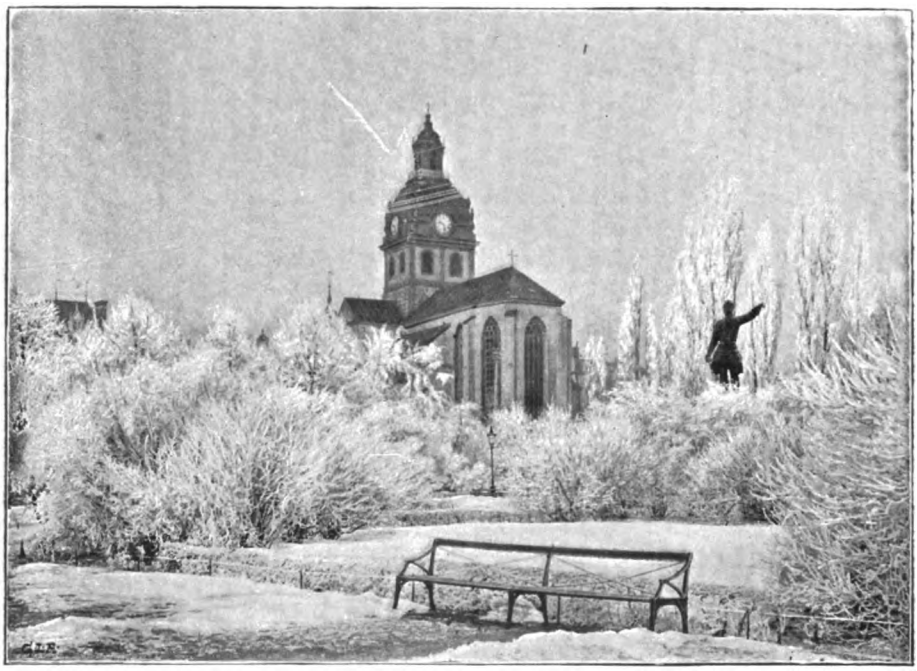
The shortness of our summer is moreover counterbalanced to a considerable degree by the *length of the summer days* and their *abundant sunlight*, whose salutary influence on both animal and vegetable life is most conspicuous in such a very northerly country as ours. At Karesuando (68° 26′ N. L.) the sun remains above the horizon during 53 successive days from May 26th to July 18th, at Haparanda (65° 50′ N. L.) a little more than 23 hours at the summer solstice, at Stockholm 18½ h., and at Lund 17½ h. This is partly due to atmospheric refraction, which increases the average length of the day by 30 minutes in the northern, and 15 minutes in the southern part of Sweden, the corresponding figures being only four minutes at the Equator. Still more important is the influence of the twilight, which adds several hours to the length of the day during the summer in North-Sweden. In fact, there is uninterrupted day as far south as Hernösand (62° 38′) from the 16th to the 27th of June.



Winter scene in Stockholm. Photo. FR. G. KLEMMING, Stockholm.

Thus the Swedish summer, especially in the North, is a season of nearly continual daylight. These light summer-evenings and nights, when all nature seems to have fallen into a quiet dream, have a magic beauty, and constitute one of the most indelible memories retained by the stranger after visiting our country.

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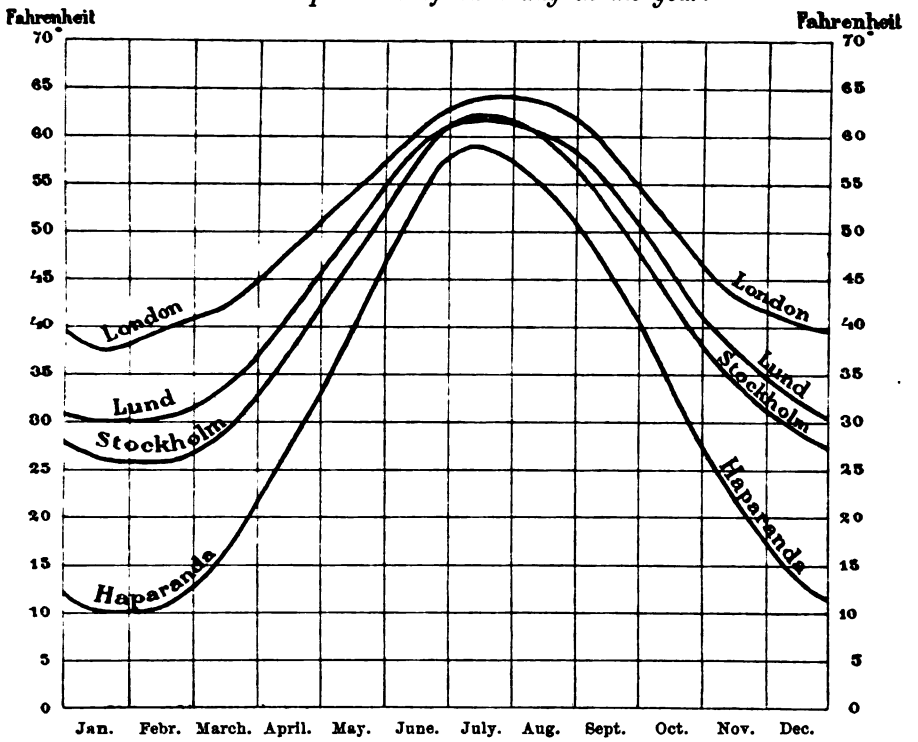
Mean-temperature of each day in the year.



The beneficial influence of the summer light in Sweden is still more increased by the considerable number of hours of bright sunshine, which is, at this season of the year, greater at Jockmock, in the interior of Lappland, than at Rome or Madrid. This is explained by the length of the time during which the sun is above the horizon, and also by our relatively clear summer sky. On an average for the whole country, only 50 per cent of the sky is covered with clouds during the month of June, and 74 in December. This phenomenon, of which the cause is unknown, brings with it very important consequences for our climate. For the heating effect of the sun-rays is thus relatively unimpaired in summer, whereas the loss of heat caused by radiation is for the greatest part intercepted in the winter season, which gives us a relatively hot summer and a not very cold winter. In the interior and the north of the peninsula, there are, however, two regions, where the winter radiation is less impeded by clouds, while the warm south-westerly winds are shut out by the Scandinavian mountain-range, and here, during that season, two centers of cold are formed, which play an important part in the winter climate of Sweden. One of them, the smaller and weaker, has its center at 62° N.L., north of Kristiania. It includes Herjedalen and North Dalarne in Sweden, and in Norway

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the district west and south of Rörås. The average temperature for January in this center is under 8·5° Fahr., and during very severe winters it has even gone as low as — 4° Fahr. The other »center of cold», which is larger and stronger, lies in North Lappland and touches both Sweden, Norway, and Finland. Here, the average temperature for January is under 3° Fahr. and has, in unusually severe winters, gone down to — 10·3° Fahr. In order to find so low a temperature for January in any other part of Europe, we must go as far east as to Petschora.

The facts mentioned above are graphically demonstrated on the two charts on pages 25 and 29, which represent the average temperatures in Sweden during the months of January and July. The isotherms on these charts show the average temperatures really observed, and not after reduction to sea-level. This explains the zig-zag course of the lines, which also approximately and roughly indicate the orographic configuration of Sweden.

Furthermore, we give here below a table showing the various lengths of the seasons at different places in our land. But for the seasons we will assume the following definitions, which correspond pretty well to what, according to the popular opinion of the Swedes, characterizes the four seasons in our country, though they are not applicable to a warmer climate than ours. We will call *summer* the time of the year during which the mean daily temperature of any place remains above 50° F., *winter* the time when this temperature remains below the freezing point, and *autumn* and *spring* the intermediate times.

TABLE 4. *Lengths of seasons at some stations.*

Stations.	Latitude N. *	The days when each season begins.				The lengths of the seasons in days.			
		Winter.	Spring.	Summer.	Autumn.	Winter.	Spring.	Summer.	Autumn.
Karesuando..	68° 26′	4 Oct.	9 May	10 June	15 Aug.	217	32	66	50
Jockmock	66 36	29 Sept.	23 April	8 June	25 Aug.	206	46	78	35
Haparanda...	65 50	21 Oct.	27 April	9 June	2 Sept.	188	43	85	49
Umeå	63 49	28 Oct.	18 April	6 June	4 Sept.	172	49	90	54
Sveg	62 2	21 Oct.	13 April	2 June	31 Aug.	174	50	90	51
Uppsala.....	59 52	15 Nov.	1 April	25 May	16 Sept.	137	54	114	60
Stockholm....	59 21	24 Nov.	29 March	25 May	24 Sept.	125	57	122	61
Örebro	59 16	18 Nov.	28 March	19 May	19 Sept.	130	52	123	60
Strömstad....	58 56	29 Nov.	20 March	16 May	28 Sept.	111	57	135	62
Jönköping....	57 47	2 Dec.	24 March	23 May	23 Sept.	112	60	123	70
Vestervik	57 46	5 Dec.	20 March	22 May	25 Sept.	105	63	126	71
Gothenburg..	57 42	18 Dec.	9 March	14 May	2 Oct.	81	66	141	77
Visby	57 39	24 Dec.	18 March	28 May	30 Sept.	84	71	125	85
Vexjö.....	56 53	26 Nov.	23 March	19 May	22 Sept.	117	57	126	65
Lund	55 42	17 Dec.	7 March	16 May	2 Oct.	80	70	139	76

* The *longitude E.* from Greenwich is for Haparanda 24° 9′, for Karesuando 22° 30′, for Strömstad 11° 11′, and for the other stations it lies between 12° and 20°. As regards the *height above sea-level*, which is here naturally of great importance, it is 344 meters for Sveg; the other figures are given in Table 3.

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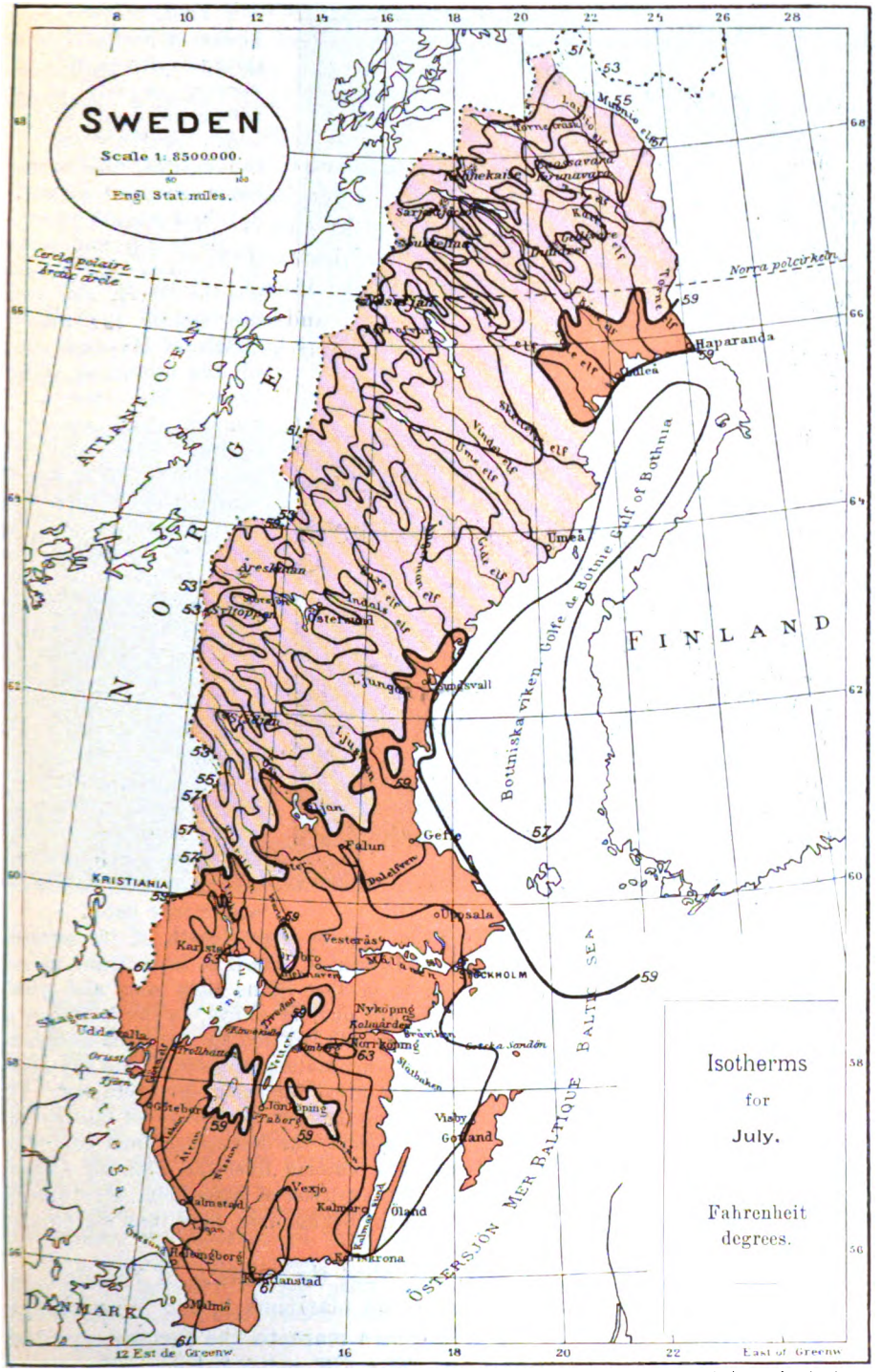

Gen Stab Lit Anst. Stockholm

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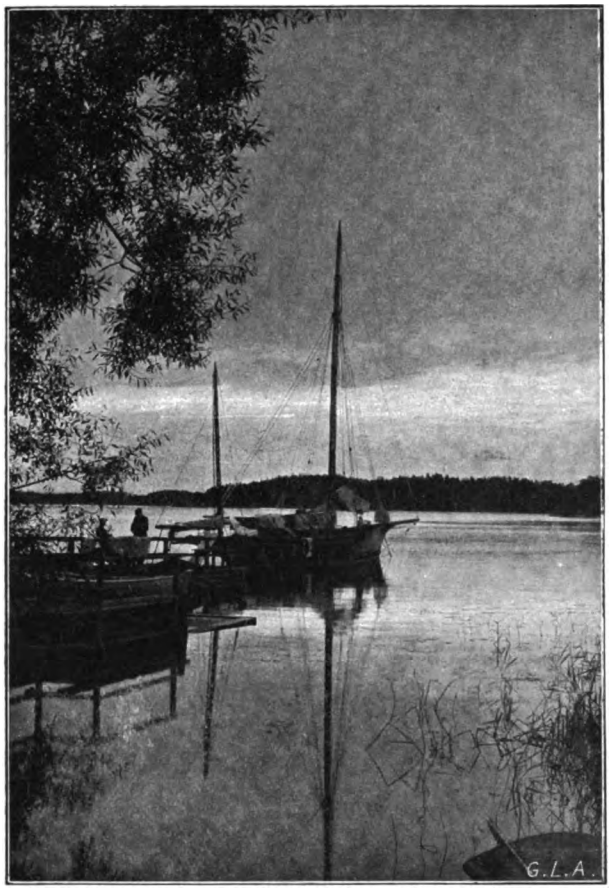

Sunset scene on Lake Mälaren.

Thus, in the northernmost part of Sweden, spring begins in May and summer as late as the middle of June, and its length scarcely exceeds two months, the autumn commencing as early as the middle of August, whereas on the south and southwest coasts spring begins in March and summer already towards the middle of May and lasts till the beginning of October. The length of summer thus somewhat exceeds $4^1/_2$ months in this part of Sweden. Winter lasts no less than seven months in the north of Lappland, viz. from October to May, whereas in southern Sweden and the island of Gotland its length does not amount to three months. — In Stockholm, winter begins the 24th of November, spring the 29th of March, summer the 25th of May, and autumn the 24th of September. Spring and autumn thus last two months each, summer and winter four each.

The island of Gotland is distinguished by the great length of its autumn, winter not beginning before the 24th of December, which is later than at any other place in our country. Also the spring of that island lasts long and yields only slowly to summer. These peculiarities are due, of course, to the influence of the Baltic. By an inspection of the table, one will find that the same phenomenon, though less manifestly, takes place also at the other stations situated on the sea-coast.

The length of the *frostless* season has a great influence on vegetation. The early frosts at the end of summer are the most dangerous enemies of the farmer in the northern Swedish provinces. At Karesuando, the last spring frost comes, on an average, the 15th of June, and the first autumn frost the 27th of August; thus there are only 72 frostless days. In the environs of Stockholm $4^1/_2$ months are frostless, and on the island of Hven, in the Sound, even more than six months.

Generally speaking, we may say that the climate of Sweden lies midway between the continental and the maritime type. The climate of the northern part, however, approaches more to the former, and that of the southern more to the latter. The difference between the winter

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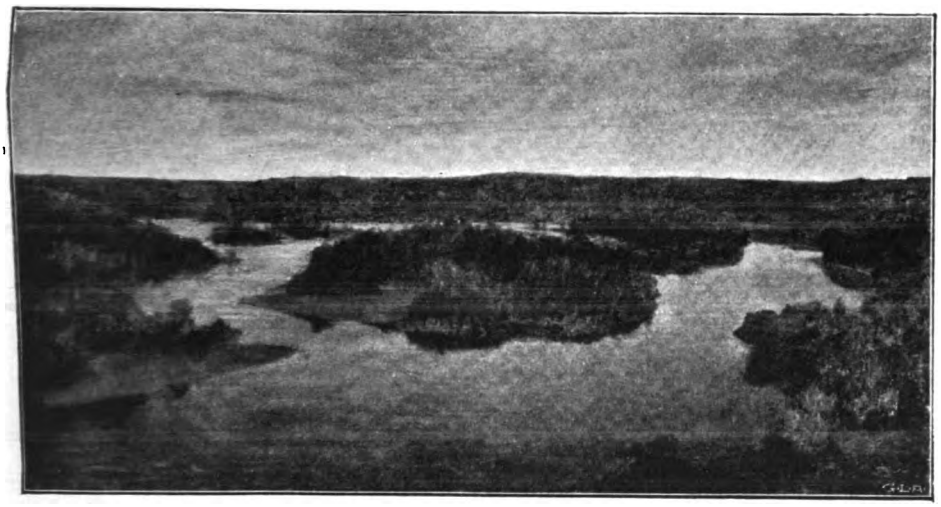
and summer temperatures is much greater than on the western coast of Europe, but much less than in the interior of Russia or in Siberia. The absolute summer maximum amounts to 86° F. in most years and stations, whereas the absolute winter minimum sinks to 5° or — 4° F. in the south and to — 22° or — 40° F. in the north of Sweden. In the neighbourhood of "the centers of cold", it is not rare that mercury freezes, and the alcohol thermometer has been observed to descend even towards — 58° F. It may be seen, however, from the tables of mortality that the severe winters of Sweden are not unhealthy. Evidently the nations of South Europe suffer more from too much heat than those of North Europe from too much cold. Certainly, the northern winter also has its particular charms, which are scarcely inferior to those of summer.



A Summer night.
From a picture by H. R. H. Prince EUGEN.

Snow falls all over Sweden every winter, but the time during which the soil remains covered with snow, varies considerably from province to province, and from one year to another. In Skåne the snow-covering remains on open plains only 47 days on the average, in the rest of Götaland 50 to 93 days, in Svealand 86 to 140 days, in South Norrland 140 to 170 days, and in North Norrland 170 to 190 days. In the severe winter of 1880—1881, snow covered the ground in the län of Stockholm during 166 days, but in the mild winter of 1881—82, only during 33 days.

Generally, snow remains on the ground longer in the forests than in the open plains, the difference of time varying from 2 to 15 days.

The snow-covering plays a very important part in the rural economy of Sweden, on account of the great help it affords in transporting timber in our vast forests. For this reason the want of snow-covering is considered in some of our provinces as a calamity nearly comparable to a bad crop. The snow-covering also protects the soil against a too strong cooling, whereas it lowers

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the air temperature. Furthermore, it forms a stored supply of water, which by its melting replenishes springs, rivers, and lakes. The *ice-covering* of the lakes remains, on the average, about 115 days in the southern part of Sweden, 150 days in Central Sweden, and 200 days, or still longer, in the North. The breaking up of the ice occurs in April in Southern and Central Sweden, whereas in the North it takes place as late as in May or June; congelation takes place in November or December, and in the north-eastern part of Norrland already in October.

Nacka.
In the Inner »Skärgård» near Stockholm.

The **state of the ice** in the waters around our coasts is a very important matter for navigation. Along the *west* and *south coasts*, the waters are covered with ice only in the most severe winters. This covering, most often in form of drifting ice, does not stretch very far into the open sea, nor continue long. Hence, it does not materially hinder ocean navigation except in quite sporadic cases, once or twice a century. The *Sound* has been covered with ice thick enough to drive on, during some severe winters. The *northern and central part of the Baltic* is covered with ice outside the fringe of coast-islands only during the most severe winters, the solid ice along the coasts ordinarily forming a band, at the most some tenths of kilometers wide, and remaining only some days or weeks. The drifting ice, however, under these circumstances may often cover a considerable part of the surface of the Baltic and accumulate in mighty heaps. Only during the mildest winters can the navigation on these waters go on the whole season without interruption by ice; between Stockholm and Visby it ceases ordinarily towards the end of December, and begins again about the 10th of April. During very severe winters the *Åland Sea* (the strait between the Baltic and the Gulf of Bothnia) is covered with practicable ice.

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The southern part of the Gulf of Bothnia (called the *Sea of Bothnia*) is frozen over every winter along the coasts but seldom, if ever, in its central part. Navigation there is impeded, on an average, from the end of November till the beginning of May either by solid or by drifting ice, with some difference for different parts and variations amounting to 6 or 8 weeks, according to the severity of the winter. A few times it has happened that the port of Hernösand was free from ice a whole winter. The *Qvarken* (the strait between the northern and southern parts of the Gulf of Bothnia) is covered with practicable ice every third or fourth winter on an average. The *Gulf north of the Qvarken*, is covered with ice regularly every winter. The freezing along the coasts occurs, on an average, about the middle of November, sometimes towards the end of October, or at the beginning of December. The breaking up of the ice ordinarily takes place between the 15th and 31st of May, seldom before the 15th of May, and sometimes as late as the beginning of June.

Fog is not frequent on Swedish waters. For the Gulf of Bothnia and the Baltic as far as Gotland, the maximum of frequency, 4 to 8 times a month, occurs in April or May; for the South Baltic and the western waters, it takes place during the winter and amounts to 7 to 10 times a month.

Moisture (rain, snow, hail, etc.) is, next to temperature, the most important climatic factor. Sufficient moisture and a duly high temperature are the essential conditions of vegetation.

The following table, which has been calculated by means of the observations made at about 430 stations, according to the results published by H. E. Hamberg, gives the average annual amount of precipitation in every län for the years 1880/94. We have verified the fact that the average for these years does not differ much from the average of observations made at about 30 stations during the years 1860/98.

Län.	Millimeters [5].	Län.	Millimeters [5].	Län.	Millimeters [5].
Stockholm	482	Blekinge	522	Örebro	603
Uppsala	482	Kristianstad	588	Vestmanland	588
Södermanland	504	Malmöhus	553	Kopparberg	540
Östergötland	525	Halland	627	Gefleborg	516
Jönköping	605	Göteborg och Bohus	642	Vesternorrland	468
Kronoberg	599	Elfsborg [2]	682	Jemtland	463
Kalmar [1]	477	Skaraborg	577	Vesterbotten [3]	459
Gotland	442	Vermland	625	Norrbotten [4]	401

The average for the whole of Sweden is 501 mm., but for the two northernmost läns only 420, for the rest of Norrland 476, for Svealand 552, and for Götaland 574 mm. For the east coast it is materially less than for the west coast. In the former, a prolonged drought is not rare, particularly in spring and the early part of summer. — In the fell-districts of northwestern Lappland, where regular observations are not made as yet, the precipitation is probably much greater than that given here for the län of Norrbotten.

[1] Northern half of the continental part 530, southern half of the same 492, the island of Öland 410 mm. — [2] Northern half 666, southern half 698. — [3] Western half 475, eastern half 443. — [4] Western half 407, eastern half 395. — [5] About 25 millimeters (accurately: 25·4) = 1 inch.

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Among the individual stations the greatest quantity of rain and snow falls at Borås (57° 43′ N. L., 12° 57′ E. L. fr. Gr.), where the yearly amount is 891 mm., next comes Björkholm (57° 20′ N. L., 12° 22′ E. L. fr. Gr.) with 851 mm. and Gothenburg with 774 mm., whereas at Karesuando the rainfall is only 313 mm., and at Kalmar only 371 mm., these numbers being the average for the thirty nine years 1860/98.

The yearly precipitation in Sweden shows considerable variations. At Uppsala, where the observations seem to be trustworthy from 1836 inclusive, the maximum was 812 mm. in 1866, and the minimum 312 mm. in 1875, the average for the sixty three years 1836/98 being 546 mm. The highest maximum hitherto observed in Sweden was 1,164 mm. at Borås in 1898, and the lowest minimum 172 mm. at Karesuando in 1891. These variations show a remarkable periodicity, of which the length varies between 4 and 8 years.

The precipitation is, furthermore, subject to considerable variations of local and accidental nature. The monthly precipitation observed at any one station may vary from zero to 300 mm. Sometimes droughts of several weeks are followed by wet periods of about the same length.

The precipitation in twenty four hours varies also between wide limits: 30 to 50 mm. falls nearly every year at some stations in summer and autumn as rain, but also in snowy winters as snow. The absolute maximum hitherto observed in Sweden is 141 mm. of rain and 90 mm. of snow in twenty four hours.

It is important to know the amount of water which falls as snow remaining on the ground in solid form and forming the snow covering. In Skåne it is only 9 per cent of the yearly rainfall, in North Lappland it amounts to 36 per cent.

As to the yearly period, the maximum precipitation occurs during the latter half of summer at most stations, and in October at some stations with a maritime situation, namely in Skåne and the island of Gotland, where a secondary maximum occurs in July or August. Along the coast of the Gulf of Bothnia, a feeble secondary maximum falls in May. The minimum occurs everywhere in February or March. Thus, the climate of Sweden is characterized by summer and autumn rain, and a relative drought from the end of winter to early summer.

Neither *hail* nor *thunder* are rare during summer, though both phenomena are less frequent and less injurious than in more southern countries.

It has already been said above that the prevailing **wind** is the southwest, to which is due the mildness of the climate of Sweden. Strong winds and storms are frequent, which is explained by the fact that the cyclones coming from the North Atlantic regularly cross our country. According to the evaluation of wind force made at the light-houses, there occur yearly, on an average, 20 storms on the west coast, 11 on the south coast, 23 in Gotland, 8 on the south part of the Gulf of Bothnia, but only 2 on its north part. These storms, though often very severe and even dangerous for navigation in our waters, are scarcely comparable to the hurricanes of the tropic oceans, nor to the most violent storms of the British Isles.

As to the **secular variations** of our climate — an interesting but difficult question — the winters seem to have become gradually somewhat milder in Sweden during the last thousand years. Thus at least it appears from the descriptions given by the chroniclers of the Middle Ages on the state of ice in the seas that wash our coasts, as well as from the observations made by the celebrated Tycho Brahe

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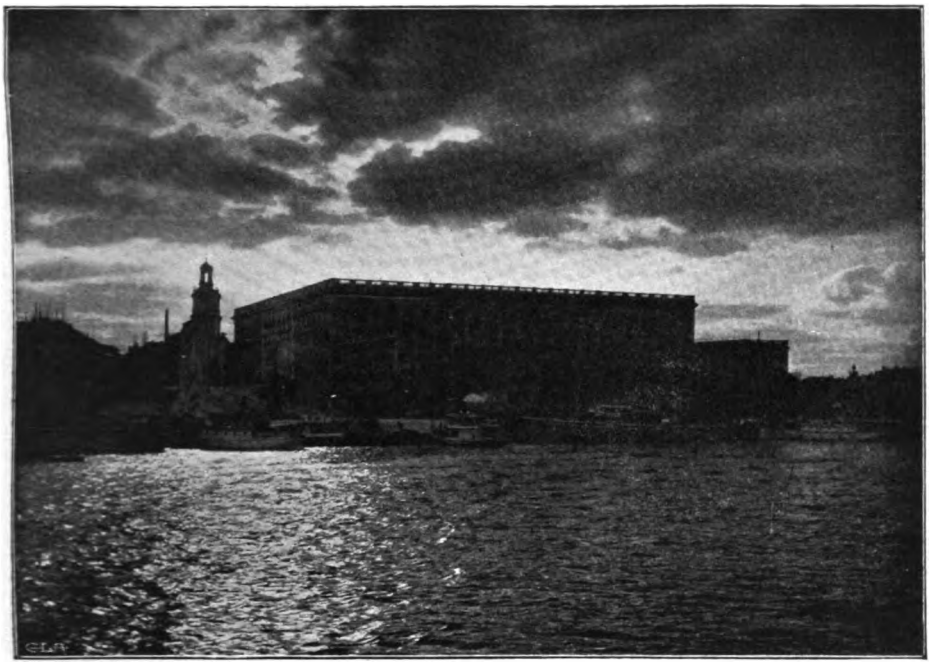
on the island of Hven, during the years 1582/97, when compared with the observations made afterwards, and up to the present time. But, as to the summer temperature, we cannot ascertain anything for the time before the middle of the eighteenth century, for want of thermometers. True it is that the observations at Lund, as well as those at Copenhagen, indicate that the present summers are somewhat less hot than those of a century ago, but, nevertheless, the space of time elapsed seems too short to permit definite conclusions as to a secular variation of this kind. As to rainfall, one might say, comparing the old series of observations with the new ones, that moisture has become more abundant, unless we must conclude from several circumstances that the old rain-gauges gave nearly always too little result.



Autumn evening. Stockholm. Photo. FR. G. KLEMMING, Stockholm.

A climatic question of the highest importance to Sweden, and there examined very carefully, is that of the **influence of the forests** on its climate. This influence is, according to HAMBERG, very slight or even immaterial as regards *temperature* and *humidity*. As to rainfall, the forests are found to cause an increase of it. It is, however, rather small in most cases, and only on the coasts, in a shoreward wind, does it amount to a high rate. But its real value is not yet known, on account of the great difficulty in exactly measuring the quantity of moisture and, especially, of snow which has fallen. According to Hamberg, the greatest part of the increase found is due to errors of observation, which tend always to diminish the quantity measured, but in a higher rate on open plains and naked mountains than on those covered with woods.

On the other hand, the influence of forests on *evaporation* and the *melting of snow* is considerable, as is also seen from Hamberg's researches. It follows

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from this that forests are of great importance as regulators of lakes, rivers, and water-sources. This has also been directly proved by the observations and calculations of O. APPELBERG, whose researches on this question may be summed up as follows: *cultivated land* promotes inundations during rainy periods and want of water during droughts; *meadow ground* gives protection from inundations but increases want of water during droughts; *wood land* always increases the quantity of water, but yields only half as much as cultivated land during a rainy period, whereas during a drought it still renders enough to efficaciously prevent want of water; *lakes* act as very efficacious regulators of the water level, by storing up the abundance of rain falling during a wet period and then delivering it slowly during a subsequent drought.

3. GEOLOGY.

Sweden, geologically viewed, is a very old country. By far the largest part of its rocks were formed during the earliest geological times — the so-called Primitive or Archæan age — and during the next or Precambrian, anterior to the appearance of organic life. Furthermore, almost the whole part of the area now called Sweden has been raised above the sea during the immeasurably long ages which have passed away since the Silurian strata were deposited. The only exception to this condition is the southernmost part of the kingdom, the province of Skåne, which was covered by the sea also during parts of the comparatively late Triassic, Jurassic, and Cretaceous periods.

Its continental character during the above-named long ages Sweden had in common with Norway, Finland, and adjoining parts of Russia. Within these lands the rocks are almost entirely of Archæan and Precambrian age, while in most other European countries younger formations, hundreds and thousands of meters in thickness, prove them to have been submerged during the larger part of the time when Sweden was dry land.

The geological formations found in Sweden, and the approximate percentage of the land occupied by each formation, are as follows: The *Primitive* or *Archæan system* 77·95 per cent.; the different groups of the *Precambrian* 9·13 per cent.; the *Cambrian* and *Silurian*, unaltered 6·43 per cent., highly metamorphosed 5·58 per ct.; the *Triassic* 0·04 per ct.; the *Rhæto-Liassic* 0·16 per ct.; the *Cretaceous* 0·71 per ct. To be mentioned are also the young beds of gravel, sand and clay etc., or the *Quaternary* deposits, which generally form a more or less continuous *surfacecovering* on the rock-basement.

Archæan. The rocks included in this system are: different kinds of gneisses, granulitic gneisses, »hälleflintas», granites, porphyries, gabbros, diorites, hyperites, and others.

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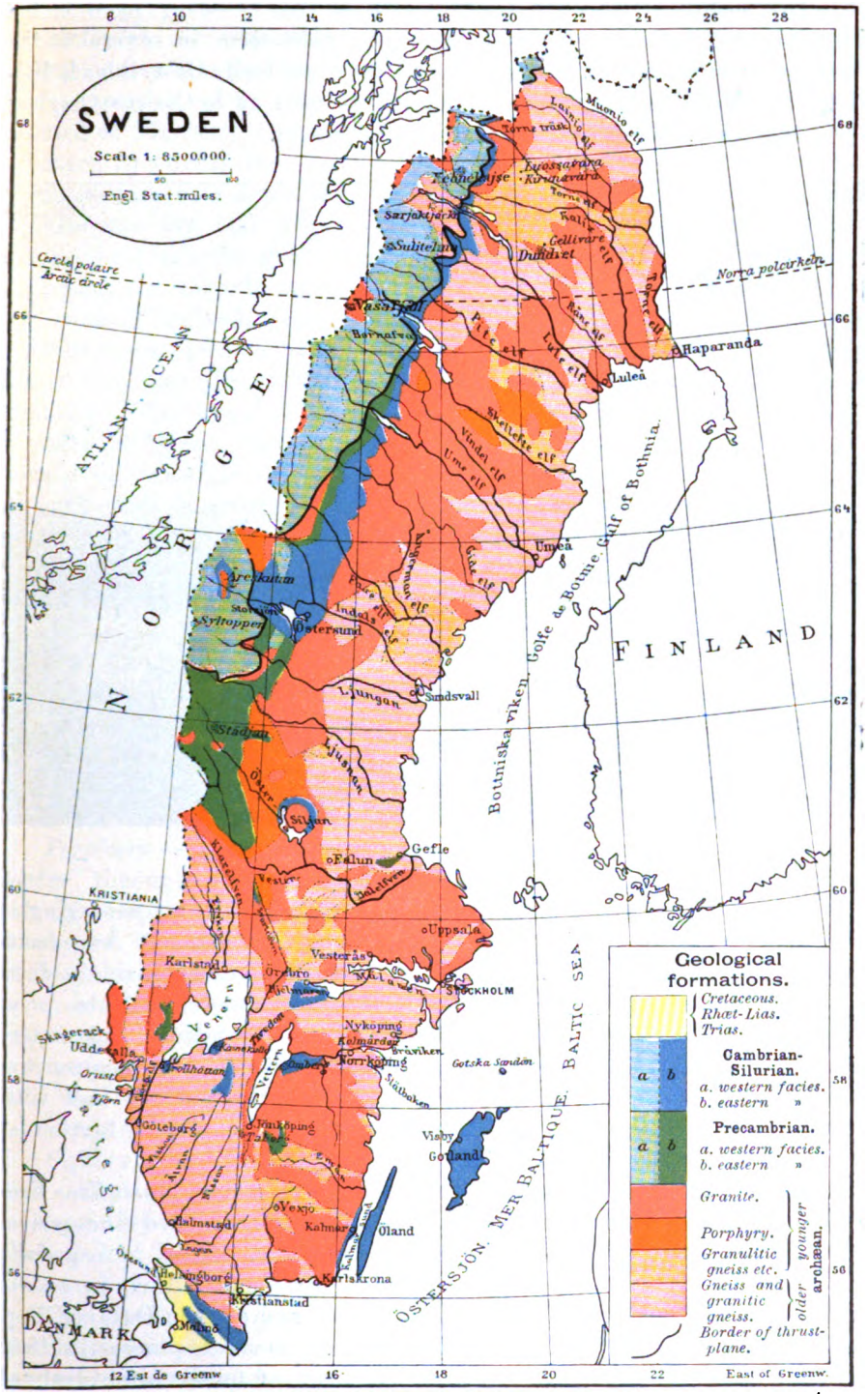

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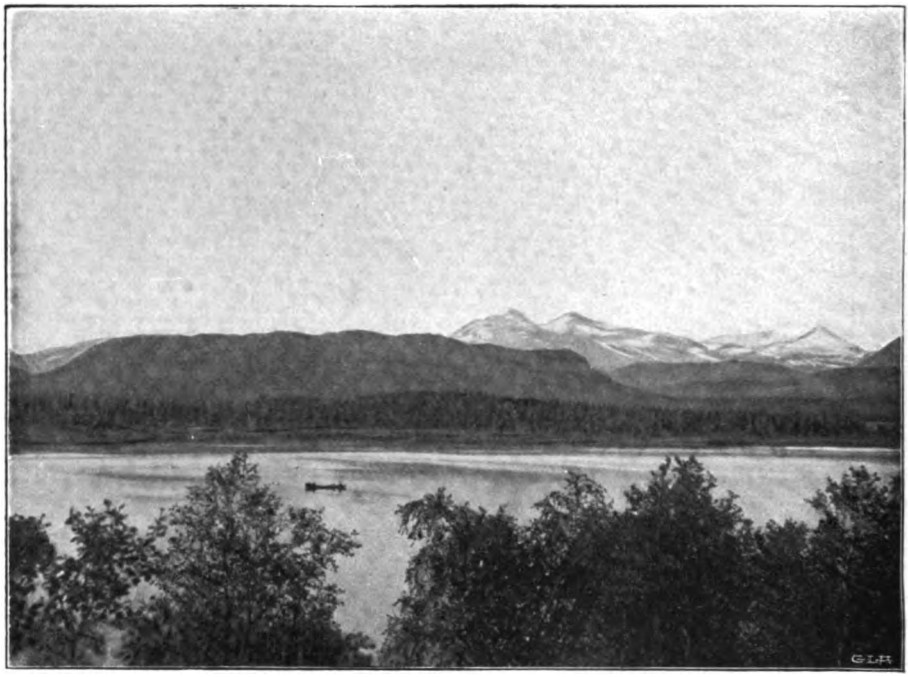
The ordinary *gneisses* predominate in the western parts of the kingdom as far north as Dalarne; they also occur in several of the eastern provinces, viz. Östergötland, Södermanland, Gestrikland, Helsingland, Medelpad, and Ångermanland, as well as in the coast-regions of Vesterbotten and a certain area in Lappland.



Mt. Ruotivare, Lappland.

Granulitic gneisses, *»hälleflintas»*, and *mica-schists*, all belonging to the upper part of the Archæan, extend over vast areas of Ångermanland, Vesterbotten, and Lappland, and are besides extensively developed in southern Dalarne, Nerike, and Vestmanland; they also occur in many localities of Uppland, Östergötland, Vermland, and eastern Småland. These latter Archæan rocks are noteworthy, because it is in them the principal ore-deposits of Central Sweden are met with, iron-ores as well as pyrites. These ores will be considered further on under the head of Mining.

Now and again layers and lenticular masses of *crystalline limestone* (marble) are found intercalating the above-named fine-grained rocks and also certain coarse-grained gneisses. This is especially the case in the eastern part of Central Sweden, that is, in eastern Vermland, in Nerike, Vestmanland, southern and eastern Dalarne, Uppland, Södermanland, and Östergötland. At several places in these districts the crystalline limestone is made use of for architectural and

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decorative purposes, as well as for the burning of lime. The marble-works of Kolmården and Claestorp in Östergötland are noted as places where the marble is utilized in the way first mentioned; the stone quarried there is of a greenish colour. For building purposes an almost white marble is quarried at Ekeberg, northeast of Örebro. Also at Malsjö in Vermland, Ålflången in Örebro län, Vårdinge etc. in Södermanland, and Vattholma in Uppland marble deposits occur, which probably are worth working.

Granites are the dominating rocks in the provinces of Blekinge, eastern Småland, the greater part of Östergötland, and Uppland. They also occur in several tracts of Nerike, Vestmanland, Bohuslän, Dalsland, and Vermland; from the latter province more continuous areas of granite extend northward through south-western Dalarne, eastern Herjedalen, and Jemtland, and over great districts of Norrland and Lappland. The granites present themselves, as to colour and texture, in many different varieties, very suitable for industrial purposes and capable of satisfying the most diverse tastes. On account of their strength and fine appearance, and of their resistency against atmospheric influences, Swedish granites have been in ever increasing demand, and have thus given rise to a considerable industry.

Veins and thick masses of *pegmatite* occur here and there in the Archæan, especially in the gneiss-districts. This kind of rock is of practical importance inasmuch as it consists of quartz and felspar developed in such a way that each may be easily separated from the other and utilized. Quartz- and felspar-quarries are worked in some of the pegmatite deposits; the most notable is the large felspar-quarry at Ytterby, north of Stockholm, which supplies the porcelain factory at Rörstrand.

Porphyry — a rock consisting of a compact ground-mass of felsitic matter, through which are scattered small crystals or crystalline granuli of felspar and quartz — is, like the granites, of eruptive origin. Porphyries are most widely extended in Dalarne and adjoining parts of Herjedalen and Helsingland, but are also found in many smaller areas in different parts of the country, from Blekinge to northern Lappland. Several of the remarkable iron-ore deposits of the latter province occur as layers between beds of porphyries. The most handsome and richly coloured varieties of porphyry are cut and polished into articles of fine art and ornaments.

Gabbro, *diorite*, *hyperite*, and *diabase*, these generally black or dark eruptive rocks, commonly called greenstones, occur sporadically in almost all parts of the country, forming massives and more or less thick dykes in the Archæan. In several places they are quarried for monumental purposes.

The Archæan rocks have mostly undergone such alterations and modifications as to texture and structural arrangement that their original characters are almost completely obliterated; but at some

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localities, viz. Grythyttan in Vestmanland, Vestanå in north-eastern Skåne, and Los in Helsingland, some rocks belonging to the youngest Archæan strata are found, that have been recognized as being altered sedimentary deposits (clay-slate, schistose conglomerate, and volcanic sediment), still retaining many marks of their original aqueous origin.

As mentioned already, the ore-deposits of Sweden are mostly found in the formations of granulitic gneiss, »hälleflinta», and crystalline limestone. The majority of the ore-deposits consist of *iron-ore*, and these are very numerous in the old mining-districts of Central Sweden, viz. in Vestmanland and the neighbouring parts of eastern Vermland and southern Dalarne. Several iron-ore mines are also found in northern Uppland, central Södermanland, and Östergötland. In the most northerly part of the country are found the enormous iron-ore mountains Kirunavara, Luossavara, and Gellivare, also Ruotivare and Svappavara. Next to the iron-ores the *copper-ores*, generally copper-pyrites, are most important. The chief copper-pyrite deposit in Sweden, and indeed among the most important in the world, is that which for nearly seven hundred years has been worked at Falun in Dalarne. Copper pyrite is now worked to a considerable amount also in the mines of Åtvidaberg and Bärsbo in Östergötland, but the same kind of ore is found and has formerly been made use of at several other mines. At Sjangeli in the vicinity of the lake Torneträsk in Lappland copper-ore of a different composition is found, viz. the gray copper-ore or copper-glance.

Tännforsen Falls in Jemtland.

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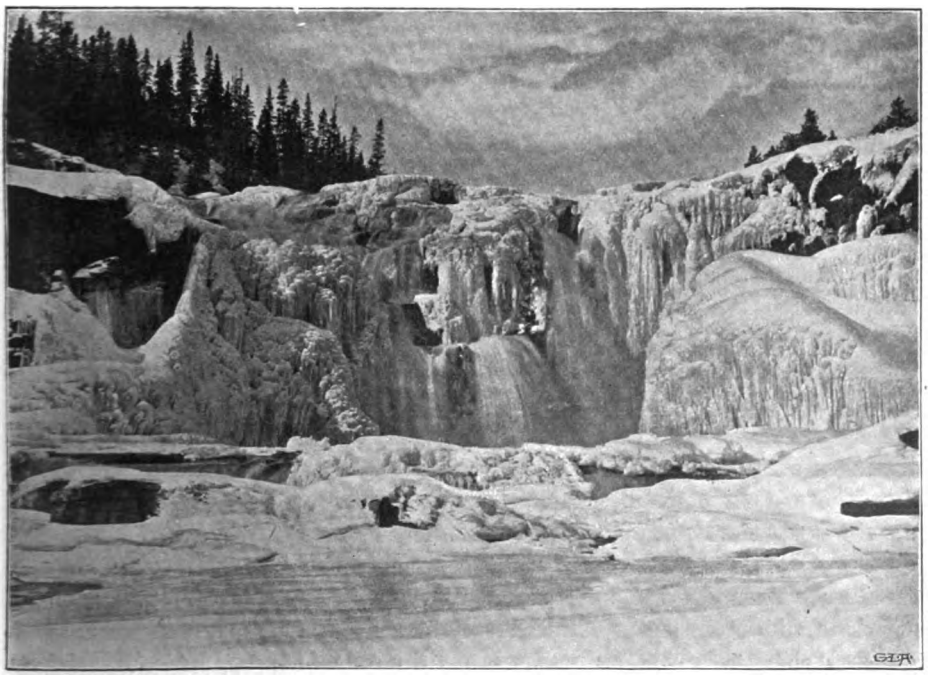
Lead-glance containing silver is found at Sala, Nya Kopparberg, Guldsmedshyttan, and Kallmora silver-mine in Vestmanland, as well as in some places in Dalarne, Vermland, and Dalsland. To any considerable amount it is worked chiefly at Sala. At the zinc-mines of Åmmeberg, in the neighbourhood of Askersund, the most important beds of *zinc-ore* (Blende) are found. *Manganese-ore* (Hausmannite) is found at Bölet, north of Karlsborg, and at Spexeryd and Hohult, south of Jönköping.

Precambrian. In several parts of the country greater and smaller districts are found where the rock-basement consists of a series of *red sandstones* in connection with conglomerates and clay-slates. These rocks have been formed prior to the Cambrian period and are therefore called *Precambrian*. Such Precambrian series are developed over large areas of western Dalarne and Herjedalen (Dala-sandstone), in the district between Gefle and Storvik (Gefle-sandstone), and in the neighbourhood of Almesåkra, south of Jönköping (the Almesåkra group). Smaller deposits of similar kind are found in Ekerön and a couple of very small islands in lake Mälaren, at Svartelfven in Vermland, and in the coast-islets of Ångermanland.

Of Precambrian age is probably also the so-called *Dalsland-group* or Dal-formation, which extends over the eastern part of Dalsland, known for its beautiful scenery. This formation consists of a great series of conglomerates, sandstones, and slates of different kinds, up-



Tännforsen Falls in Winter garb.

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turned and compressed by foldings to a mountain-range, which, though not forming now any very prominent topographical feature, yet very likely reached a considerable altitude before the upper portions of it, in the course of time, was removed by denudation.

A series of conglomerates, sandstones, and slates named the *Visingsö-group*, which now forms the bottom of lake Vettern, its islands, and lower shores, is by some geologists regarded as being of Precambrian age; by others it is supposed to belong to the Triassic.

A great part of our alpine range consists of a series of mica-schists, quartzites etc. (the *Seve-group*), which are remarkably crumpled, inverted, metamorphosed, and dislocated, and supposed to be of Precambrian age.

During Precambrian and younger periods, repeated eruptions of *diabase* took place. The molten rock spread, in the form of more or less thick lava flows, on and between the strata of the sandstone spoken of (for instance in the district of the Dala-sandstone) or filled up fissures in the rock-basement, thus forming more or less vertical dykes. The rocks of the Precambrian territories are in many places quarried and made use of; thus, for instance, the Dala sandstone and Gefle sandstone for building purposes, mill- and grind-stones, and the clayslate of the Dalsland group for roofing.

Cambrian and **Silurian** deposits, consisting of sandstone, alum-slate, various kinds of limestone, and clay-slate, are met with in several of the provinces of Sweden. The Silurian district of Jemtland is the greatest in area. It extends widely around lake Storsjön, and is continued northwards by a broad belt of Silurian rocks extending through Lappland and skirting the alpine highlands almost parallel with the boundary between Sweden and Norway. Going south, another district of the same character is found in southern Dalarne, encircling the granite region between lakes Siljan, Orsasjön, and Oresjön. Deposits of Cambrian sandstone and alumslate and of Silurian limestones and clay-slates also occur west and south-west of lake Hjelmaren in Nerike, in the district between Motala, Vadstena, Skeninge, and lake Roxen in Östergötland, in Kinnekulle near lake Venern, in mount Billingen and the neighbourhood of Sköfde and Falköping in Vestergötland, in Halle- and Hunneberg — mountains east of Venersborg — in southern and south-eastern Skåne, in Gotland and Öland, and on the mainland along the western shore of Kalmar Sund, opposite the last-named island. All these Cambrian-Silurian districts are only remnants of series of strata — formerly more widely extended — deposited by the sea, which during Cambrian and Silurian times covered the greater part of Sweden and large areas of the adjoining countries.

The sandstone rests immediately on the Archæan rocks and is, together with the black or dark slate (alum-slate) on top of it, considered as belonging to the **Cambrian system.** The overlying grey clay-slates,

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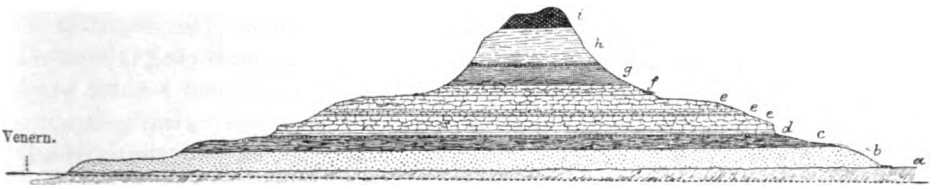
with the grey or red limestones deposited on them, and again other clayslates, belong to the **Lower Silurian.** Conformably overlaid the Lower Silurian rocks are the **Upper Silurian** deposits of limestone, marl-slates, and sandstones, which extend over the whole of Gotland, the western part of the Silurian area of Jemtland, the greater part of the Silurian area of Skåne and minor parts of that of Dalarne, Östergötland, and Vestergötland. In the sandstones and alum-slates of the Cambrian system we meet with fossil remains of the earliest animal life known in Sweden, viz. medusæ, worm-tracks, trilobites, and others — all water animals. The Silurian rocks contain numerous petrifications of trilobites, orthoceras, graptolites, bivalves, crinoids, corals, and others. In the Upper Silurian strata of Gotland have been found the earliest air-breathing animals known, a scorpion and an insect.

Mount Kinnekulle in Vestergötland gives easy access to well developed Cambrian and Silurian strata. A section of the mountain is given here below.



Section of Mt. Kinnekulle.

From West to East. Scale of height five times as great as that of length.

a. Archæan gneiss. — *b.* Sandstone, grey or yellowish, 34 meters. — *c.* Alum-slate with bituminous limestone, 22 m. — *d.* Lower Graptolite-slate underlaid by a layer of Ceratopyge-limestone, together 11 m. — *e.* Red and grey limestones (Orthoceras-limestone), 52 m. — *f.* Chasmops-limestone, 10 m. — *g.* Trinucleus-slate, 34 m. — *h.* Upper graptolite-slate with a 3 m. thick layer of Brachiopode-slate, 56 m. — *i.* Diabase.

A meter = 3·281 feet = 1·094 yard.

In like manner as on Kinnekulle, there is also on Billingen, on Halle- and Hunneberg, and some other mountains in Vestergötland a bed of *diabase*, which, overlying the Silurian strata, has kept them from destruction in consequence of its greater hardness and power of resistance. The Silurian districts of Dalarne, Nerike, Östergötland, and Skåne, on the other hand, have been preserved to our days, because, after the Silurian age, they were displaced by great dislocations and sunk below the surrounding parts of the ground, thus being protected from the forces ordinarily active in gradually abrading and destroying rock surfaces.

The Cambro-Silurian beds have well-nigh everywhere an almost horizontal position, except in western Jemtland and in the alpine regions farther north, where they have been much folded and compressed when

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the Scandinavian mountain chain was formed. Their rocks became, at the same time, much altered, and the inclosed fossils often completely crushed and obliterated. Yet, various finds of Silurian fossils as far up as in northernmost Lappland show that the Cambro-Silurian sea submerged even those parts of the Scandinavian peninsula which now rise several hundred meters above the sea. The metamorphosed Silurian rocks referred to above, consist of many different kinds of mica-and hornblende-schists, the so-called *alpine-schists*, comprised under the name of the *Köli-group*, or the western Silurian facies of the alpine regions.

The Cambro-Silurian rocks are of great importance for practical purposes. A light-coloured Cambrian sandstone is quarried and used for building-material as well as for mill- and grind-stones. A grey, soft, easily worked Upper-Silurian sandstone in the southern part of Gotland has been used for many church-buildings in the island. Some of the Silurian limestones also make an excellent building-stone. For the burning of lime the limestone and the alum-slate are quarried in many places in Vestergötland and Nerike, where the bituminous alum-slate generally serves as fuel in burning the limestone. The burnt alum-slate was formerly used as raw material for manufacturing alum.

When Sweden had gradually been raised above the sea by which during the Silurian-period it had been covered, it retained, with the exception of Skåne, its character as main-land during those immeasurably long periods when, in other places, thousands of meters of mighty formations were built up. In connection with the rising of the land, which undoubtedly required ages for its accomplishment, the original formation of the Scandinavian mountain-range must have begun and been finished, while at the same time, in its northern parts, huge mountain masses of older Precambrian formations were, in the process of plication, overthrusted and pushed from east to west over the younger Silurian formations, so that the succession of strata in Åreskutan, in the plateaus of Offerdal, and in many other parts of the eastern boundary of the alpine regions now appears wholly abnormal, older formations covering the younger. During the evolutionary period now considered, the process of general decay, the rushing waters, and other forces were effective in transforming and leveling the contours of the surface. Rivervalleys were excavated and extended, plateaus and mountain ridges were shattered and carried away, and all parts of the relatively looser Cambro-Silurian formations that had not settled below the surface of the surrounding Archæan rocks, or been protected by lava-like coverings of harder eruptive rocks, were destroyed.

The present geological structure of *Skåne*, and the distribution of its formations, among which the trias-, jura-, and cretaceous systems are lacking in other parts of Sweden, is chiefly caused by dislocations or faults. Some faults are of a considerable extent, for example the one which stretches from the coast at Höganäs in a south-easterly direction

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past Helsingborg, Lund, and the western side of the Romeleklint to the neighbourhood of Ystad. This fault measures about 130 kilometers in length. On the southwestern side of it, the bed-rock in the neighbourhood of Höganäs has sunk downward about 180 meters and in some places much more. Worth mentioning is the fact that such considerable dislocations are generally not noticeable by any topographical features on the surface of the land, unless the bedrock at the elevated side of the fissure of dislocation consists of gneiss, or of other relatively hard rocks. The differences in height caused by dislocation have been leveled by later denudation.

The **Triassic system,** especially its upper division — *Keuper* — is developed in Skåne. The strata consist of red and greenish, or in other ways variegated clays, marls, and sandstones with conglomerates. They crop out north of Höganäs and in the tracts east and north-east of Landskrona, continuing underneath the adjacent Rhæto-Liassic formation. Borings have been sunk in them to a depth of 180 meters without reaching their bottom.

The varying series of strata belonging to the *lower group of the* **Jurassic system** (the *Lias*) and to the passage-beds from the underlying Keuper (the *Rhætic group*), occur within three districts, together occupying an area of 800 sq. kilometers. The northernmost of these districts is the largest, extending between Höganäs, Skelderviken, Hallandsås, Söderåsen, and Landskrona. The middle district is situated near the borough and railway-station of Eslöf, and the southern has the form of a narrow belt, following the boundary of the Silurian system, from lake Vomb to close north-east of Ystad. The formation consists of alternating fine-grained sandstones (chiefly white and yellow), grey or black clays — among them also fireproof clay — grey or black clay-slates and shales, and, at several levels, some seams of *coal.* The deposit, as a whole, is therefore called *the coal-bearing formation of Skåne.* The layers are commonly horizontal or very slightly inclined. Their aggregate thickness varies in different localities, partly in consequence of the different amount of denudation. At Höganäs the formation has been found to attain a thickness of 240 meters.

It is chiefly the lower parts of the formation that contain coal-seams of sufficient value to warrant their working, and this circumstance makes it necessary to sink the shafts, not only through the often quite thick, superficial accumulations — the Quaternary deposits — but also through the greater part of the coal-bearing formation itself before the valuable beds are reached.

The layers, however, being much disturbed by faults, the depth on which such beds are found varies considerably. Thus, for instance, the coal-seams of Höganäs lie about 100 meters below the present surface, those of Bjuf about 30 meters, and those of Skromberga and Bosarp yet higher up. The thickness of the coal-seams worth working

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varies between 0·3 and 1 meter; and they ordinarily rest on layers of fire-clay or shales, that are quarried with the coals and furnish the material for a considerable manufacture of fire-proof bricks, sewerage pipes, tiles, etc.

In a few places the sandstone is quarried for the purpose of making grind-stones and mill-stones out of it.

The clay-slates and shales of the coal-bearing formation contain in many places well preserved fossil remains of the vegetation dominant at the time of their accumulation. In the upper parts, which principally consist of sandstones, are found marine fossils, chiefly molluscs.

The **Cretaceous system** extends over a large area of south-western Skåne and over a considerable district around Kristianstad, Åhus, and other places in the north-eastern part of the province. The deposits found in the first-named district consist partly of white chalk containing layers and nodules of flint, partly of limestones (Saltholm-limestone and Faxe-limestone), occupying the largest area, partly also of a calcareous sandstone (Köpinge-sandstone), in the neighbourhood of Ystad, and of a kind of marl at Eriksdal and Kullemölla close to the boundary of the Rhæto-Liassic district north of Ystad. The north-eastern Cretaceous district is occupied partly by a limestone consisting chiefly of crumbled shells and stalks of bryozoæ (Ignaberga-limestone), partly by a soft, almost earthy limestone, and partly by quartz-sandstone.

The thickness of the Cretaceous system has not been ascertained; a borehole that was sunk north of Ystad to the depth of 450 meters did not reach its bottom. The limestones of this system are of great economical importance, and several technical industries are established to utilize them. White chalk is quarried and made ready for use at several places. Saltholm-limestone is quarried on a large scale, constituting, together with clay, the raw material to the manufacture of Portland Cement at Lomma. The Ignaberga-limestone and the soft, earthy variety are used for the burning of lime; they are also ground and used as manure, for which purpose these limestones seem to be very suitable as they contain a notable percentage of phosphoric acid. At many places in north-eastern Skåne the Cretaceous limestones overlie a bed of kaolin, under which is found the Archæan rock, more or less decomposed.

From the period following the Cretaceous, or the **Tertiary,** no sedimentary deposits are known in Sweden; but during this period great disturbances took place in the rock-basement of Skåne. Great dislocations in the form of faulting set in, following fracture-lines going in the direction of north-west to south-east, while certain districts, especially some Cretaceous areas, were sunk one thousand meters and more beneath the adjoining territories. Volcanic eruptions also occurred, and remnants of their lava-beds and ash coverings are met with in the form of *basalts* and *basalt-tuffs* north of lake Ringsjön in the central

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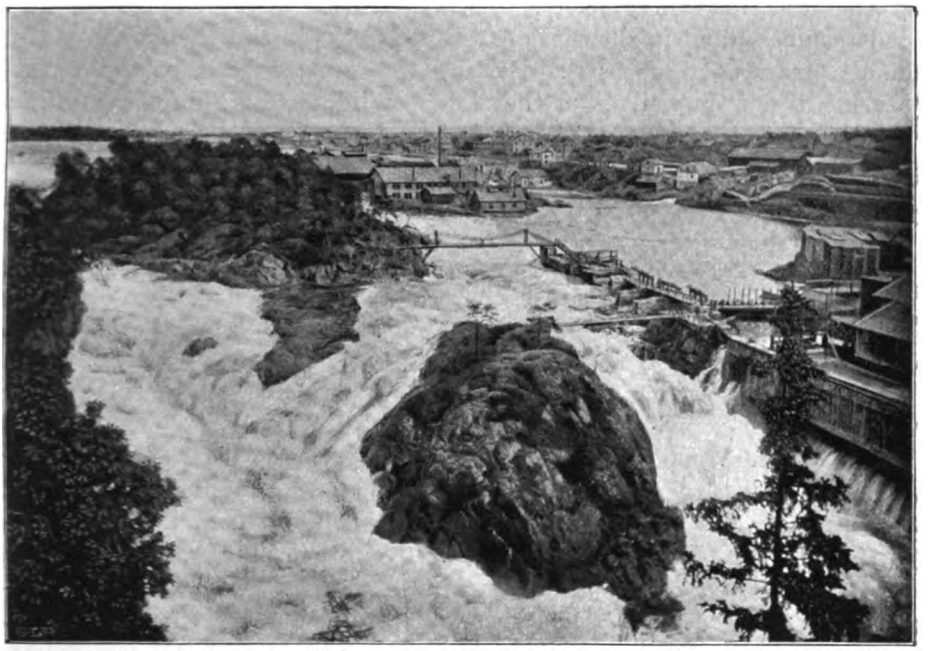
part of Skåne. Probably at the same time, eruptions occurred in Småland at the locality where now lake Mien is situated, and in Helsingland in the district of lakes Dellen. In both places volcanic rocks are found, *rhyolite* in the former, *andesite* in the latter place. The *nepheline syenite* and the interesting *melilite basalt* in the neighbourhood of Sundsvall (Alnö) are also regarded as later than the Cretaceous period.



Trollhättan Falls.

The bedrocks of Sweden mentioned above are to a large extent covered by moraine matter, gravel, sand, clay, and other accumulations, deposited during the period following the Tertiary and continuing up to the present time, viz. the **Quaternary.** Even before the end of the Tertiary period a deterioration of climate had taken place all over the northern hemisphere; it reached its maximum during that part of the Quaternary period which is named the Glacial. At that time glaciers spread from the highest parts of Scandinavia, gradually uniting so as to form an immense ice-sheet — a land-ice — which finally, perhaps after thousands of years, covered not only the Scandinavian peninsula, but also a great part of northern Europe. These glaciers and this land-ice swept before them and carried away such detritus as had accumulated during preceding geological periods. The surface of the underlying rocks was also to a certain degree worn, smoothed, and striated by means of stones and gravel carried along underneath the ice.

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When, after thousands of years, the cold had passed its climax, and an improvement in the temperature set in, the ice-fields began to retreat and finally became restricted to the central, highest parts of the Scandinavian peninsula; but on the ice-worn surfaces of rock there was left an extensive deposit of moraine-detritus consisting of earthy, sandy, or clayey material, more or less charged with stones of all sizes. This material had been carried underneath, within or on the surface of the ice-fields and glaciers. In Sweden such moraine-material, »*till*» and »*boulder-clay*», is the most extensively spread and the most common of all Quaternary deposits. By far the greater part of the forest-bearing tracts as well as of the slopes of hills and highland mountains consist of this material. When the moraine-material is derived from soft rocks, as for instance Silurian clay-slates and limestones, it is clayey and calcareous (boulder-clay, moraine-clay, moraine-marl) and makes good arable land. The fertile plains of Skåne consist chiefly of such calcareous boulderclay.

Another kind of deposits, formed in close connection with the melting away of the ice in our country, are the remarkable ridges of sand, rounded gravel, and pebbles which are called *åsar* (kames). They are supposed to have been formed by glacier-rivers, which, running under the ice, found their way from the interior of the ice-fields towards the ice-border, making tunnel-like passages in the ice and depositing the material carried along — pebbles, coarser and finer gravel and sand — near the outlet, as the current grew less strong. Ridges of this kind occur in almost all parts of the country, where they often run continuously for many miles, at a distance of a few to twenty kilometers from each other, sometimes rising to a height of 30 to 50 meters. A part of the city of Stockholm is built on one of these ridges. Sometimes one dominant ridge is joined by tributary ridges, just as a river by its affluents.

At the end of the *Glacial period*, when the great land-ice was in process of recession, Sweden was partly submerged under the sea. Gotland and Öland were altogether covered by this *Glacial ocean*, and so were the provinces round lake Mälaren as well as the greater part of Östergötland. The surroundings of lake Venern were also submerged to an extent of 140 to 180 meters, and the Western ocean joined what is now the Baltic by a broad strait across Nerike. On this submerged territory, sediment, carried out by the glacial streams, was deposited, forming the often beautifully stratified clay, *glacial-clay*, which is now found extending over our largest plains as well as in valleys. In several places it contains shells of the little arctic bivalve, *Yoldia arctica*, and remains of other arctic animals corresponding to those now living in the ocean near Spitzbergen and Greenland. Where the clay has been washed out of calcareous moraine-material, that is to say on and south of the Silurian and the Cretaceous territories, it is more or less cal-

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careous (clayey marl). Such is the case in Uppland (where it comes from a Silurian district at the bottom of the Gulf of Gefle), Östergötland, and other places.

The strait across Nerike became shallower and shallower as the country rose again out of the glacial sea, and the Baltic was by and by completely cut off from the ocean and transformed into a freshwater lake. This lake was larger than the present Baltic, for it extended, besides, over the provinces of Uppland and Södermanland, by far the largest part of Nerike and Östergötland, parts of Gotland and Öland, and quite a broad strip of the coast of Norrland. At this period a clay, not very thick, was deposited, which in many places covers the glacial clay. In this clay and in contemporaneous shore deposits a little mollusc, *Ancylus fluviatilis*, has been noticed, which lives only in fresh water. The great freshwater basin above described, has therefore been called the *Ancylus-lake* and the age during which it existed, the *Ancylus-period*. When, in consequence of the rising of the land, the strait across Nerike was closed, the waters of the Ancylus-lake cut new outlets at the places where now the Belts and the Öresund are situated, and when, at the end of the Ancylus-period, a slow submergence took place of the region around the southern part of the Baltic and the German Sea, the waters of the latter broke into the Ancylus-lake, and the Baltic thus became an inland sea with brackish water.

The communication thus opened was wider than at present, and the percentage of salt in the Baltic a good deal higher. In the deposits of that time a mollusc, *Litorina litorea*, has been found, which does not now live in the central or northern parts of the Baltic. These *Post-glacial* deposits have been called the deposits of the *Litorina-period*. Almost the whole of Uppland, a large part of the provinces round lakes Mälaren and Hjelmaren, and the shores all the way from Skåne northwards to Haparanda were then to a greater or smaller extent covered by the Litorina-sea. In Uppland the water rose 60 meters higher than at present. During this period was deposited the grey, unstratified clay, which, within the districts mentioned, covers the glacial clay and other older quaternary deposits to a depth of one or two meters, and forms the larger part of our cultivated land.

In general, the marine deposits constitute the best and most easily cultivated soil of Sweden, and in consequence they are almost entirely claimed for agricultural purposes. Therefore, the best cultivated and most densely populated districts of the country coincide, on the whole, with the territories that in glacial and post-glacial times were submerged under the sea.

Sweden is very rich in **lakes.** Besides the larger lakes Venern, Vettern, Mälaren, Hjelmaren, Siljan, Storsjön, Hornafvan, and others, innumerable smaller lakes are found in the different parts of the country.

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Peat-bogs occur in yet greater number and generally occupy depressions in the superficial beds of moraines and other quaternary deposits covering the bedrock. Most of these peat-bogs were originally water-basins, which have been slowly filled up. Many of them have, during the last decenniums, been transformed into cultivated land, and others are utilized for the production of peat-fuel.

The basins where the lakes and peat-bogs now are situated depend partly on the broken and uneven surface acquired by the Archæan rocks through weathering and other agencies during the periods when they were not covered by the sea, partly on damming up by the moraine deposits of the Glacial period.

Another feature, characteristic of Sweden, are its **coast-islets,** i. e. clusters of numerous islets and skerries, forming with their surrounding waters, a kind of small and varying archipelagos along certain parts of the coast (each cluster called *»skärgård»*). These islets are the highest parts of territories which before the Glacial period belonged to the mainland and now are again partly raised over the level of the sea.

The **rising of the country** still continues at the rate of about half a meter in a century. This phenomenon was known 150 years ago. It was then named »the decrease of waters» and much discussed by Swedish scientists.

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4. THE VEGETATION.

Sweden may, with regard to vegetation, be divided as follows: the Alpine region, the Birch region, the Firwood region, the Oak region, and the Beech region. The diversity in the vegetation of the different regions is caused chiefly by climatic influences, while the dissimilarity found in different localities within the same region more depends on the soil and the history of evolution of the surface-covering.

The **Alpine region** is principally characterized by the absence of trees. This region is limited to the highest part of the country, the extreme northwest of Sweden, and occupies a large territory extending with few breaks along the boundary of Norway from the extreme north to central Herjedalen, including also some isolated mountain tops in the vicinity east and south. Its lower boundary is considered to be where the birches commence to appear and reach a man's height. Farthest north this boundary is found at an altitude of about 550 meters above the sea-level, but ascends slowly to 950 meters in the part of the region farthest south.

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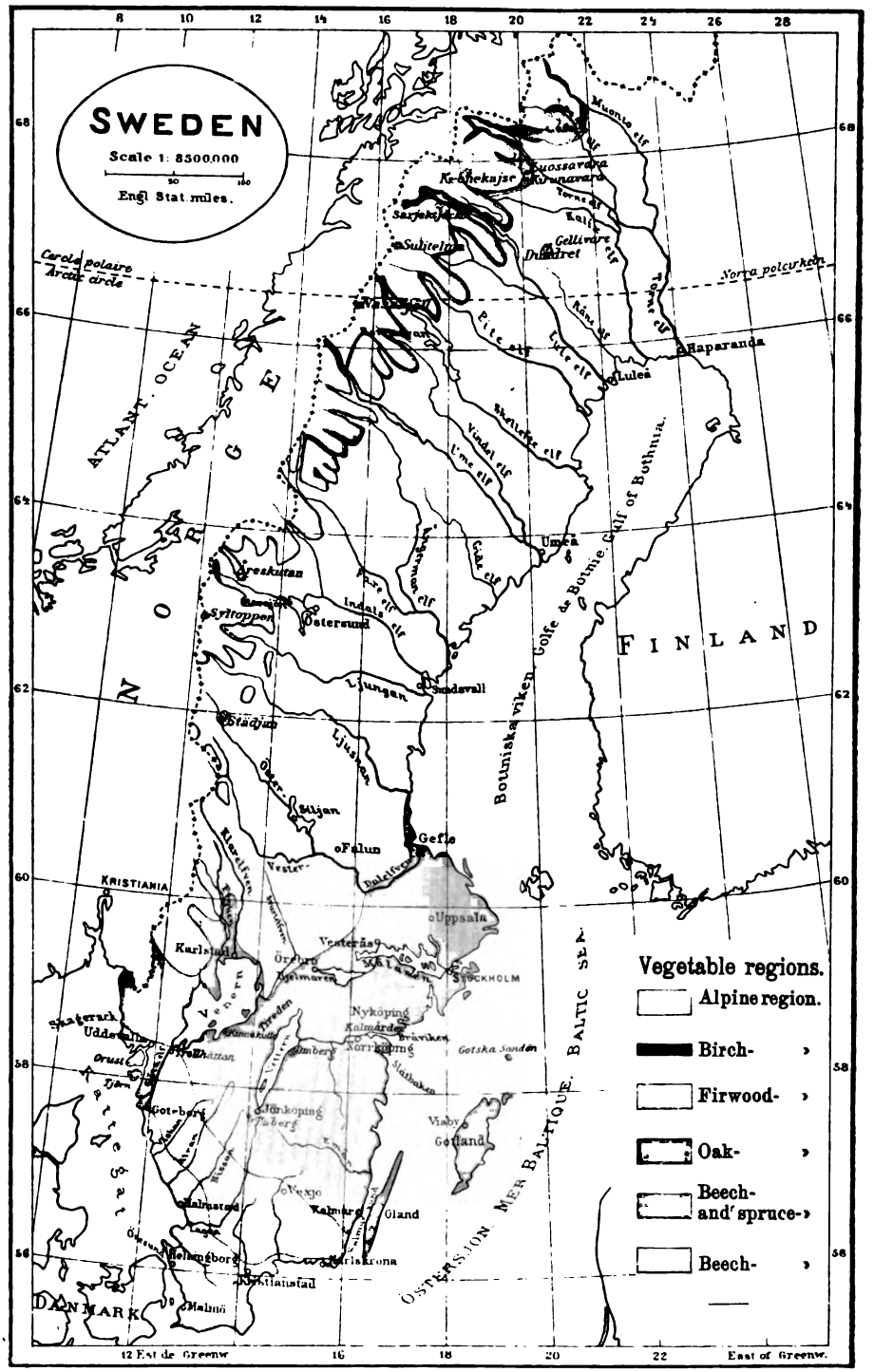

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On the Lule River. Photo. V. Odelberg.

In tracts where the soil throughout summer is kept moist by melting snow-water the dwarf-willow (Salix herbacea L.) is spread over the ground like a thick carpet in which a number of plants, as Ranunculus nivalis L. and glacialis L., Saxifraga stellaris L., Sibbaldia procumbens L., and others, are met with. Where the snow melts away before midsummer, as it does on the largest part of the region, leaving the ground dry, the *alpine heaths* are found, characterized by a bottom-covering of lichens and mosses and a thin upper one of dwarf shrubs, as alpine heath (Phyllodoce cærulea Bab.), trailing Azalea (Azalea procumbens L.), black bearberry (Arctostaphylus alpina Spreng.), Diapensia lapponica L., common crowberry (Empetrum nigrum L.) and red whortleberry or cowberry (Vaccinium vitis idæa L.). Among these shrubs grasses are found interspersed, such as highland rush (Juncus trifidus L.), spiked wood-rush (Luzula spicata DC.), and plants and herbs like Polygonum viviparum L. and Trientalis europæa L. The monotony is broken here and there by depressions covered by a carpet of dark sedges (Carex), but the lakes lack flowering plants.

In the lower parts of the alpine region, especially in the vicinity of mountain streams, thick willow-copses occur composed of Salix lanata L., glauca L., and lapponum L., interspersed with Salix phylicifolia L. In drier places they are superseded by dwarf-birch (Betula nana L.).

The **Birch region** is characterized by woods made up of common birch (Betula odorata Bechst.) with solitary aspen (Populus tremula L.) and mountain ash (Sorbus aucuparia L.). This region forms a very irregular belt below the Alpine, which belt farthest north, where the birch region is best developed, is about 30 kilometers broad, but it gradually becomes narrower, and is farthest south only a few hundred

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meters broad and even less. Its lower limit, assumed to be where the pine-trees begin to appear more commonly, is farthest north hardly 400 meters above sea-level but ascends gradually towards the south to about 900 meters.

In certain localities where the ground is calcareous, *birch-woods rich in plants* occur, especially marked by a luxurious carpet of high-growing, large-leaved plants, such as wood-crane's-bill (Geranium silvaticum L.) and alpine sow-thistle (Mulgedium alpinum Less.) On the rest of the region with dry and meagre soil, *birch-heaths* alternate with *mossy birch-woods*, which woods, as regards the surface-covering, nearly coincide with corresponding pine-woods. Where the ground is moist, it is occupied by extensive *bogs* marked by numerous species of sedges and cotton-sedges (Eriophorum) together with Scirpus cæspitosus L., sparely intermingled with dwarf-birch, bog-whortleberry (Vaccinium uliginosum L.), Andromeda polifolia L., and others, and a bottom-covering, in which leaf-mosses, as Amblystegium and Dicranum, are more abundant than bog-mosses (Sphagnum). Lakes, streams, and bogs are often bordered by vast willow copses, chiefly consisting of the above-mentioned species of Salix together with Salix nigricans Sm. Flowering waterplants are but sparely found.

The **Firwood region** occupies the north of Sweden below and south of the birch region. Its southern boundary coincides with the northern boundary of the region where the oak is commonly found, and stretches from Söderhamn along the shore to the Dalelf, and thence in south-westerly direction to lake Skagern, from where it bends northwards to the upper Fryken lake and then southwards again into Norway.

The woods are composed of pine (Pinus silvestris L.) and spruce (Picea excelsa Link), frequently much mixed with birch in the parts of the region nearest to the Birch region, and also in other localities which in later times have been swept by fire. Besides firwoods in various states of development, peat-bogs and, below the uppermost marine limit,* rock associations decide the character of the landscape. In the valleys of the Torne-, Great Lule-, Pite-, and Skellefte-rivers and in a few other places the boundary-line of the firwood region is occupied by pine, in other valleys and everywhere along the watersheds by spruce. Close to the Birch region a narrow belt of spruce woods is ordinarily to be found. In the western part of Ume Lappmark and Jemtland this belt expands into a spruce district many miles in width. Large spruce districts are also found between the river valleys along the watersheds. These spruce districts are characterized by mossy and boggy spruce woods alternating with peat-bogs. The country along the larger rivers is commonly occupied by pronounced pine districts, in which spruce is found in depressions and along the brooks. While in the interior of the country the pine and spruce woods are distinctly separated, mixed firwoods are peculiar to the coast, increasing going southwards. Cultivated districts of any extent are, as a rule, only found along the river valleys below the marine limit.

* The districts formerly submerged by the glacial sea.

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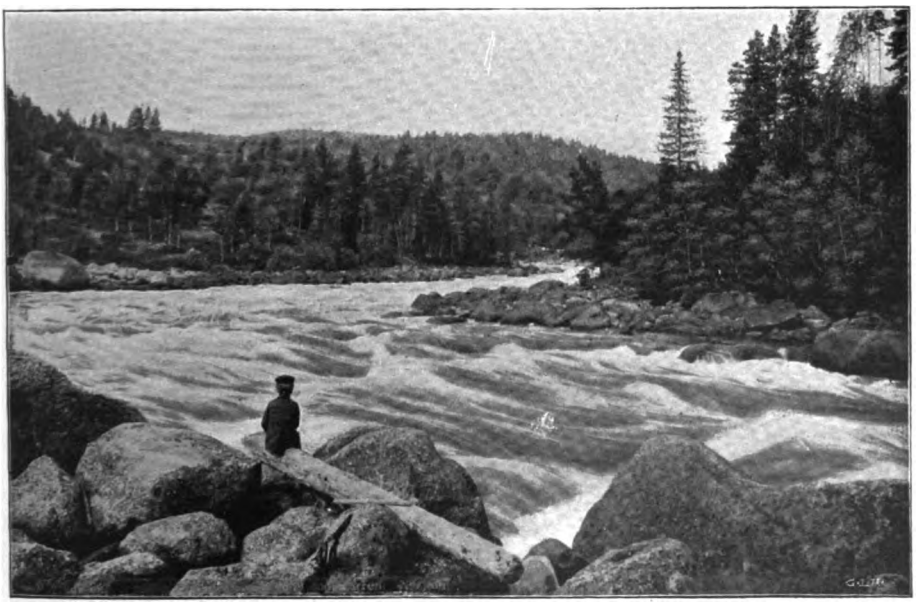
The *firwoods* have commonly emerged from fire clearings. Birch appears, as a rule, first on such clearings, but is always sooner or later displaced by fir-trees. In this way are generally first formed unmixed pine woods with a bottom-covering of reindeer-moss (Cladina species) and small moss-spots — *pine heaths*. The moss expands slowly — forming a closed moss-covering — and so *mossy pinewoods* are developed. In the moss-covering the spruce-seeds find suitable ground for germination. Hereby the spruce gradually appears as the under-growth in the pine woods and later on takes as important a place as the pine — *mixed firwoods* — until it finally altogether supersedes the pine — *mossy spruce woods*. As this development takes place, the ground-covering is also changing. In the moss-covering, which originally consists of Hylocomium parietinum L. interspersed with spots of Dicranum, Hylocomium proliferum L. makes its appearance and becomes finally the dominant moss of the spruce woods. On the pine heaths the red whortleberry or cowberry-shrub is dominant in the north, while heather (Calluna vulgaris Salisb.) predominates in the south of the region. With these are intermingled bilberries (Myrtillus nigra Gilib.), crowberry, common bearberry (Arctostaphylus uva ursi Spreng.), wavy hair-grass (Aira flexuosa L.), Trientalis europæa L., and others. The bearberry and heather disappear gradually in the mossy woods, while the other species mentioned grow more abundant, especially cowberries and in a yet higher degree bilberries. Besides these, there appear some other species as Linnæa, wood-rush (Luzula pilosa Willd.), Majanthemum bifolium Schmidt., cow-wheat (Melampyrum sylvaticum L. and pratense L.) in the mossy pine woods, and in the spruce woods also broad shield-fern (Aspidium spinulosum Sw.) and Polypodium Phegopteris L. From these types of woods are evolved *boggy firwoods* of diverse qualities in such a way that bog-plants more or less supplant the former surface growth. Such plants are Polytrichum commune L. and species of Sphagnum, Carex globularis L., wood horse-tail (Equisetum silvaticum L.), with most of the plants peculiar to peat-bogs, as Ledum palustre L., bog-whortleberry and cotton-sedge (Eriophorum vaginatum L.).



Vångforsen Rapids in the Ångerman River. Photo. N. G. Nilsson, Sollefteå.

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Peculiar types of woods of less extension are very thin spruce woods with a surface-covering of wavy hair-grass, and spruce woods with an exuberant surface-growth of herbs and grasses like the birchwoods above referred to.

Other trees spread all over the firwood region, but all hold a subordinate position. Such are aspen, mountain-ash, bird-cherry (Prunus Padus L.), alder (Alnus incana Willd.), and, in solitary places in the southern part, lime (Tilia europæa L.), elm (Ulmus montana With.), maple (Acer platanoides L.), and hazel (Corylus avellana L.). In the coastdistricts are also found a variety of white birch (Betula verrucosa Ehrh.) and common alder (Alnus glutinosa Gærtn.).

Willow copses often appear along the river banks. In the higher districts they are mostly composed of the same species as in the birch region, Salix lapponum L. and Salix glauca L. together with Salix phylicifolia L. and Salix nigricans Sm. The two former become more sparse in the lower districts, and at the coast only the two latter remain. The *peat-bogs* are in some localities very extensive. In the interior and northern parts they are all very similar, the bog-moss-covering is rather poorly developed, and the character is given particularly by sedges and purple melic-grass (Molinia cœrulea L.) together with the cloudberry (Rubus Chamæmorus L.), whilst the dwarf-birch and bog-whortleberry appear less. Farther south the peat-bogs are more diverse, and the bog-moss-covering is more strongly developed. The above-mentioned species of grasses generally compose only a narrow belt round the edge of the bogs, whose aspect as a whole is determined, sometimes by dwarf-birch, sometimes by heather together with cotton-sedge and cloudberry. In the lakes a great number of flowering species are found, but a high grass belt is lacking or poorly developed. Where the rock-foundation appears above the soil, thus chiefly below the marine limit, *rock-associations* are found. When they appear in the firwoods, they are characterized by a covering of reindeer-moss intermingled with crust lichen spots, alternating with spots covered with heather, but in open places the reindeer-moss is superseded by leaf-mosses and the heather by grasses.

The **Oak region** extends between the firwood region and the northern boundary of the territory in which the beech-tree is spread over continuous districts. This boundary may be said to follow a line drawn from central Bohuslän to Värnanäs, 20 kilometers south of Kalmar.

The oak region encompasses both wood-growing districts, within which only small tracts are cultivated, and large plains for the most part cultivated, both Silurian plains and those below the marine limit. In the wooded districts firwoods alternate with peat-bogs and — below the marine limit — with rock-associations. On the plains the peat-bogs are superseded by sedge marshes, and there the plant-associations which are especially peculiar to the oak region — oak-woods, leaftree-meadows, and herb-filled firwoods — have their largest extension. As the original type of vegetation in this region has been largely changed by cultivation, the oak region is nowadays chiefly marked by the common appearance of a number of trees and plants which either are not found at all or very sparely within the firwood region. Such are oak (Quercus pedunculata Ehrh.), ash (Fraxinus excelsior L.), maple, elm, lime, Swedish beam (Sorbus suecica L.), hazel, blackthorn (Prunus spinosa L.), hawthorn (Cratægus oxyacantha L. and monogyna Jacq.), honeysuckle (Lonicera xylosteum L.), common buckthorn (Rhamnus cathartica L.), and others.

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The *firwoods* of the region are generally mixed firwoods characterized by the same plants as those of the preceding region, to which several new species are added. The firwoods have by heavy cutting often been transformed into pastures with sparsely growing firtrees and birch, and more grass and herbs than in normal firwoods. The *oakwoods* are made up of oak interspersed with ash, elm, and others, and a lower growth of hazel, hawthorn, wild rose, blackthorn, and others, with plenty of herbs and grasses between the bushes. The *leaf-tree meadows* are marked by their groups of diverse leaf-trees, as oak, ash, maple, lime, aspen, birch, Swedish beam, bushes in thin groups made up of hazel, hawthorn, blackthorn, wild rose, and others, with a luxuriant surface covering of herbs and grasses. The *herb-filled firwoods* are peculiar by the absence of cowberries, bilberries, and wavy hair-grass and by their wealth of herbs and grasses. By devastation of woods, wide districts in Bohuslän and Vestergötland are transformed to heaths. The *peat-bogs* are of about the same character as those in the southern part of the firwood region. The *sedge marshes* are marked by a thick carpet of sedges with herbs strewn in, with or without a bottom-covering of Amblystegium.

In the Mining districts of Central Sweden.

The *lakes* are often marked by a well-developed, high grass-belt of the common reed (Phragmites communis Trin.), common bulrush (Scirpus lacustris L.), cat's tail (Typha angustifolia L.), and others. Within this belt a floating leaf-belt appears, made up of water-lilies (Nymphæa, Nuphar), pond-weed (Potamogeton natans L.), and others, after which other plants continue, of which only the flowers are above water or else altogether below the surface. The rocks appear as in the firwood region.

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The **Beech region** embraces the southern part of the country with Öland and Gotland, although the beech does not occur wild on these islands. The southwest boundary-line of the territory where the spruce occurs wild, goes through Halland 5 to 10 kilometers from its eastern limit down through the north of Skåne to the south end of lake Immeln and thence through the south of Blekinge. This boundary-line divides the beech region into two quite distinct districts. With the exception that beech here and there occurs, the vegetation of the northern district has the same character as that of the oak region. In the southern district the character of the landscape is marked by large cultivated plains together with beechwoods and, in a lesser degree, alder-bogs and — particularly along the above mentioned boundary-line — extensive heaths. Fields of drift-sand give in several places a peculiar character to the coasts.

The *beech-woods* are generally quite compact. The ground is covered with beech-leaves and — except on moss-covered rocks — only solitary plants are met with, such as wood-anemone (Anemone nemorosa L.), wood-sorrel (Oxalis Acetosella L.), oak fern (Polypodium Dryopteris L.), wavy hair-grass, and others. Thin beech-woods with a surface-covering of bilberry are only exceptionally met with.

The *heaths* have originated from oak- or beechwoods destroyed by fire or injudicious cutting, or on formerly cultivated fields. They are marked by a dense growth of heather interspersed with cowberries, crowberries, cross-leaved heath (Erica tetralix L.), sheep's fescue (Festuca ovina L.), wavy hair-grass and, in the southwest, hairy green-weed (Genista pilosa L.), and others. The bottom-covering differs according to the state of development of the heath. In the first stage it consists of rarely-occurring species of Cladonia and Polytrichum, which later on are superseded by reindeer-moss and finally by leaf-mosses (Hylocomium species). Boggy heaths occur also, marked by bog-moss and sweet gale (Myrica Gale L.). The heaths are slowly developing into woods again. The *drift-sandfields* are marked by a belt of downs with lymegrass (Elymus arenarius L.) and sea maram (Psamma arenaria R. & S.). Directly inside of these downs are, on the east and south coast, woods (planted) met with, while on the west-coast a heath-belt with reindeer-moss, sea sedge (Carex arenaria L.), heather, and crowberry is found between the downs and the woods.

Even the **sea** has its peculiar vegetation, which is chiefly composed of sea-weeds and is best developed on a firm bottom. Besides, the development is chiefly determined by the strength of the light and the salinity of the water. Best developed on the westcoast, where the water is most saline, this vegetation will be poorer and of other character in the Baltic and the Bothnian Gulf according to the diminution of the salinity towards the north.

The decreasing light towards the depth causes a distribution of the sea-weeds into different depth regions and only allows their descending to a slight depth, in greater abundance only to about 40 meters. Three depth regions are discerned. On the westcoast the upper one — *the litoral region* — is characterized by bladder seaweed (Fucus vesiculosus L.), knobbed wrack (Ascophyllum nodosum Le Jol.), cutweed or black wrack (Fucus serratus L.), and other great olivaceous or brown sea-weeds; the middle one — *the sublitoral region* — especially by

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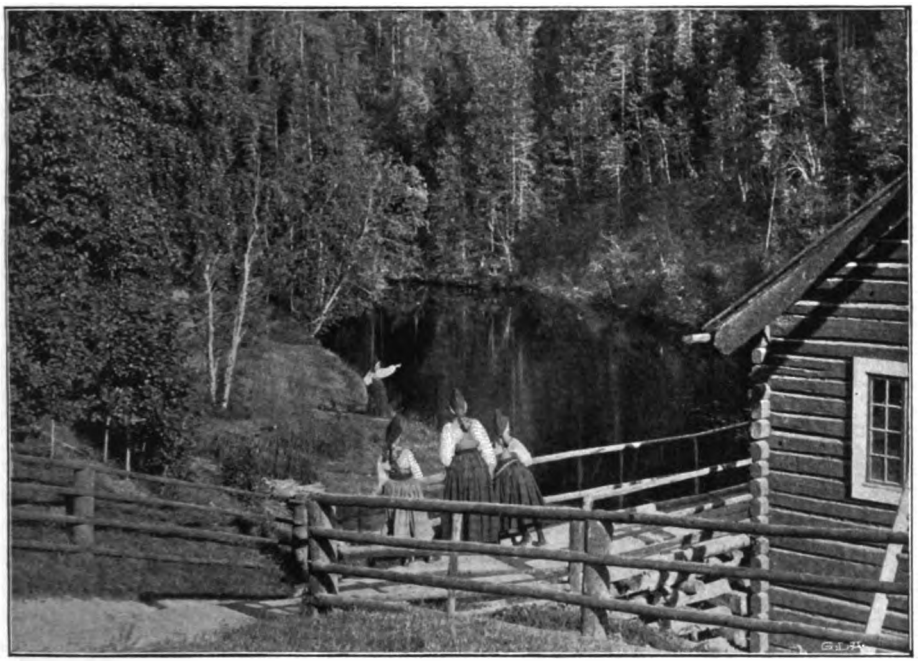
thick masses of deep-sea tangle (Laminaria saccharina Lamour. [sugar-wrack]) and digitata Lamour.); and to the lowest region — *the elitoral region* — red sea-weeds (florideæ) give a peculiar character. Laminaria cannot stand the less saltish water of the Baltic, and also the red sea-weeds are strongly diminishing towards the north of the Baltic, where the elitoral region does not exist. The green sea-weeds, on the contrary, often form a green covering of the rocks near the surface of the water, and the above mentioned high-grassbelt often characterizes shallow, land-locked bays.



At the Mill-pool. Rättvik in Dalarne. Photo. GÖSTA FLORMAN, Stockholm.

The flora of Sweden consists of about 1,600 species of wild flowering plants (this number not including about 150 introduced species), whereof about 1,050 are found in Skåne, 680 in Helsingland, 510 in the province of Vesterbotten, and 190 in the alpine region of Lappland. Most of the species are more or less widely spread also beyond Sweden. Endemic, that is, in our country exclusively appearing and here evolved forms are ordinarily not enough distinguished to be considered as species, but are regarded as subspecies or varieties and are to be found especially in varying genera, particularly Hieracium, of which genus (according to Dahlstedt) about 700 to Sweden endemic subspecies hitherto are described.

The changes of the climate in different seasons naturally has great influence on the vegetation. The proper vegetation period, being limited to the warmer part of the year, diminishes in length towards

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the north. The time employed for the alimentary work of the trees — from the spring to the fall of leaves — thus varies between 3 months in the farthest north and 5 months in the farthest south of Sweden.

The vegetation of Sweden — as well as that of the whole Scandinavian peninsula and Finland — compared with other countries with equal climatic conditions, is chiefly characterized by the following peculiarities:

The Alpine region is marked by the alpine heaths, poor in species, whilst anything corresponding to the pastures of the Alps with their wealth of species is lacking. The existence of a birch region is especially peculiar, as in other countries fir-trees constitute the wood-boundary. The firwoods consist of only two species — pine and spruce — while in other countries different species of larch (Larix), silver fir (Abies), and russian cedar (Pinus Cembra L.) are found with them. The regular alternation of fir-woods with peat-bogs and rock, associations which marks large parts of the country, is rarely found elsewhere, and this alternation together with the prevalence of freshwater-associations gives to the country its most pronounced character.

These peculiarities are closely connected with the soil and the process of evolution undergone by the vegetation. The alpine region consists of rock species which contain comparatively very little lime, and the greater part of the country below is a hilly territory of Archæan origin. The vegetation has immigrated after the Glacial period. Some species, as the spruce, have, during the process of immigration, not yet arrived at their climatic limit, and others, as the above-mentioned foreign fir-trees, have not yet reached our country.

5. FAUNA.

During the so-called glacial epoch, a geological period comparatively near to our time, the whole of the Scandinavian peninsula was, as Greenland now is, perpetually covered with thick ice, which reduced the organic life to a minimum if, indeed, it existed at all. But other climatic conditions appeared later; a warmer period succeeded the cold one, and the mass of ice covering Scandinavia began, by degrees, to melt away, and the country became once more habitable. The ice was closely followed, in its retreat northwards, by the flora and fauna existing here at present, which have thus entered our country at a comparatively late period.

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It is thus evident that, on our peninsula, ancient forms cannot be found which differ widely from those of other countries. But, on the other hand, on account of climatic conditions and the still extensive forests, a number of forms have been able to survive here which have long since disappeared from southern and central Europe. Another consequence of climatic conditions is the great difference displayed in animal life, especially by the insects and birds, during summer and winter. As for the birds, this difference depends, to a great extent, upon the number of migrants, which come in spring to breed, enlivening the landscape from the high mountains and great mountain lakes down to the lowland and sea-coast, and which then fly away in autumn to warmer climates, leaving mountain, field, and forest silent and deserted. A number of species, too, rest here during their journey, in certain places which then sometimes display, for several weeks, pictures of changeful and noisy bird life. Such resting places are southern Öland and Skelderviken, others are more to the north on the eastern coast of Sweden and on the coast of Halland, but also in Skåne as well as several places in the interior of the country, where some of our migratory birds stay for a longer or shorter period of their migrations. Another remarkable feature of the Swedish fauna, also dependent upon the long, snowy winters, is the white winter-dress of certain birds and mammals, by means of which some of them, such as the hare and ptarmigan, obtain protection from their enemies; while others, such as the arctic fox and the weasel, are enabled to steal unnoticed upon their prey. It may also be remarked that the fauna of Sweden, like that of all other northern countries, is marked by its poverty in reptiles and batrachians. Thus, there are found here but three kinds of snakes, of which only one — the viper — is poisonous, three lizards and some ten amphibians, of which latter the greater number is confined to the most southern part of the country. Concerning the invertebrate terrestrial animals, whose distribution cannot, of course, be treated of here, it may be briefly mentioned that the mollusc fauna is fairly rich in species, and that insect life is rich, even in the most northern parts of the country, where especially some very rare and brilliant species of butterflies are found.

It is clear that in a country of such great extent from north to south, and with such varying natural conditions as Sweden possesses, both the land fauna and the flora must present themselves very differently in different districts. Such defined limits as those of the flora cannot, however, be marked out for the various districts of the fauna, animals not being so dependent upon the nature of the soil, and upon climatic conditions as plants are, besides which they also perform extensive wanderings to tracts where they do not properly belong. This, however, does not prevent certain forms being said to characterize a certain district, and another, some other tract, while, again, some are spread in suitable localities over the greater part of the country, and some over the whole land, from the northernmost fells to the level fields of Skåne.

Only some few vertebrate animals are spread over the whole country, as, among the mammalia: the common hare (Lepus timidus), the common field-vole (Arvicola agrestis), the ermine, and the common weasel (Mustela erminea and nivalis), of which the latter species is, however, less common; and amongst the birds: the teal (Anas crecca), the red-

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breasted sheldrake (Mergus serrator), the great snipe and the common snipe (Telmatias major and gallinago), the golden plover (Charadrius apricarius), the dunlin (Tringa alpina), the wood-sandpiper (Totanus glareola), the common sandpiper (Actitis hypoleucus), the white wagtail (Motacilla alba), the wheat-ear (Saxicola œnanthe), and the willow warbler (Phyllopseustes trochilus).

Many more are distributed over the whole of the land which lies below the woodless mountain district. This is the case with the squirrel (Sciurus vulgaris), the common shrew (Sorex vulgaris), the lesser or pigmy shrew (S. pygmæus), and the water-shrew (Crossopus fodiens), the common fox (Vulpes vulpes), the most common bat in Sweden — Nilsson's bat (Vesperugo borealis) — the mallard or wild duck (Anas boschas), the great spotted woodpecker (Picus major), the cuckoo (Cuculus canorus), the common swift (Cypselus apus), the hooded crow (Corvus cornix), the magpie (Pica caudata), the yellow bunting (Emberiza citrinella), the chaffinch (Fringilla cœlebs), the sand-martin (Cotyle riparia), the house-martin (Chelidon urbica), and the swallow (Hirundo rustica), the flycatcher (Muscicapa ficedula), the great titmouse (Parus major), the garden-warbler (Sylvia salicaria), the common redstart (Luscinia phœnicurus), the fieldfare (Turdus pilaris), and, as far as cultivation has reached, the house-sparrow (Passer domesticus). The following reptiles and batrachians are also widely distributed in Sweden: the common viper (Vipera berus), the ringed snake (Tropidonotus natrix), the scaly or common lizard (Lacerta vivipara), the blind-worm (Anguis fragilis), the common frog (Rana temporaria), and the common toad (Bufo vulgaris).

If we now proceed to the various fauna districts which may be distinguished in our country, it will be most suitable to begin with the **mountain regions** situated above the tree-limit. There, amongst the mammalia, we meet, besides the hare, the field-vole and the weasels, a number of boreal voles, such as Arvicola rufocanus, ratticeps, etc., the lemming (Myodes lemmus), well known for its peculiar migrations, the arctic fox (Vulpes lagopus), and the glutton or wolverene (Gulo borealis). We ought also to include amongst the fauna of our mountainous districts the wild reindeer (Rangifer tarandus), although it is nowadays very seldom met with on the Swedish side of the mountain slopes. The common bear (Ursus arctos) and the common wolf (Canis lupus), which properly belong to the deep forests, are often met with on the mountains. Amongst the more characteristic birds belonging to this fauna, the following deserve to be specially mentioned: the ptarmigan (Lagopus mutus) and the willow-grouse (Lagopus albus), the latter of which, however, is widely distributed through the northern forests right down to the coast, the whistling swan (Cygnus musicus), the white-fronted goose (Anser erythropus), the long-tailed skua or parasitic jæger (Lestris parasitica), and the red-throated diver (Colymbus septentrionalis), which, together with a number of ducks, breed in the waters of the alps, the dotterel

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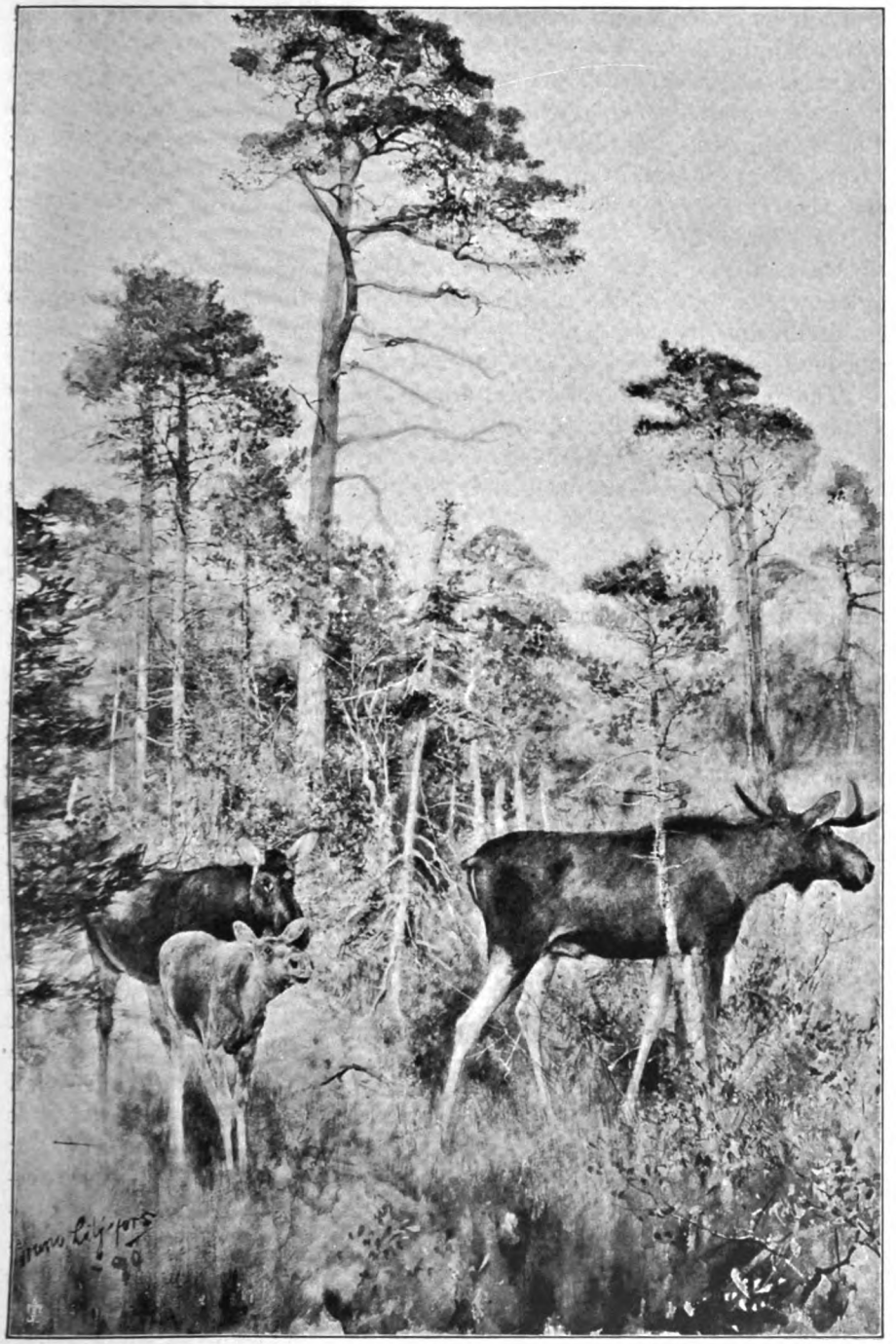

An Elk family.
From a picture by BRUNO LILJEFORS.

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(Charadrius morinellus), and several other wading birds, the golden eagle (Aquila chrysaëtus), the gyrfalcon (Falco gyrfalco), the European merlin (Falco æsalon), the rough-legged buzzard (Buteo lagopus), the white or snowy owl (Athene nyctea), the short-eared owl (Asio brachyotus), the shore-lark (Alauda alpestris), the snow-bunting (Plectrophanes nivalis), the Lappland bunting (Plectrophanes lapponicus), and the ring-ouzel (Turdus torquatus), which, however, is also found in Bohuslän.

Only a few birds can be said to be characteristic of the **birch region** which borders the alp-district; such are, the brambling (Fringilla montifringilla), the common redpoll (Acanthis linaria), the blue-throated warbler (Luscinia suecica), and the redwing (Turdus iliacus).

The **region of the great coniferous forests** commences on the slopes of the mountains, below the region of the birch, extending from thence, with insignificant interruptions, over by far the greatest part of Sweden; eastwards to the coast-islets of the Gulf of Bothnia, southwards through Norrland over a great portion of Svealand, and continuing, interrupted by the large plains of Östergötland and Vestergötland, over the highlands of Småland. We have already mentioned that the common bear and the common wolf have their real homes in the dense forests nearest to the alps. The same is the case with the European lynx (Lynx lynx). These, the three greatest of our beasts of prey, have in olden times had a much wider range than nowadays, and as recently as 1850/60 there were wolves in Uppland and Vestergötland. To the great coniferous forests also belong the pine marten (Mustela martes) and the principal antlered denizen of the Swedish forests — the elk (Alces alces) — which is found from the polar circle as far down as Småland. In the forest-districts of the boreal regions we find amongst the birds, in addition to the willow-grouse previously mentioned, the Siberian jay (Garrulus infaustus), which latter is replaced, farther to the south, by the common jay (Garrulus glandarius). The capercailzie or cock of the woods (Tetrao urogallus), the hazel-grouse (Tetrastes bonasia), the common crane (Grus cinerea), and the woodcock (Scolopax rusticola) also belong to the dense forests. In the marshes and at the lakes within this district, together with a number of lesser waders and ducks, the black-throated diver (Colymbus arcticus) breeds, and farthest northwards, the bean-goose (Anser segetum) and the golden-eye or garrot (Clangula glaucion). Numerous birds of prey have also their proper homes in the forests as, for example, the goshawk (Astur palumbarius), the sparrow-hawk (Astur nisus), the common buzzard (Buteo buteo), the honey-buzzard (Pernis apivorus), the osprey (Pandion haliaëtus), the eagle-owl or great owl (Bubo bubo). Amongst the small birds which characterize the great coniferous forests, even the southern ones, may be mentioned: the songthrush (Turdus musicus), the redbreast (Luscinia rubecula), the siskin (Acanthis spinus), the great crossbill

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and the common crossbill (Loxia pityopsittacus and curvirostra), which are so completely adapted to the northern climate as to lay their eggs already in February, and further, the bullfinch (Pyrrhula pyrrhula), and also a number of Parus: the crested titmouse, the boreal titmouse, and the coal-titmouse (Parus cristatus, borealis, and ater), and the golden-crested wren (Regulus cristatus). Farthest up in the north, breed the Lappland owl (Strix lapponica), the Bohemian waxwing or waxen chatterer (Ampelis garrulus), and the pine grosbeak (Pinicola enucleator). The great black woodpecker (Dryocopus martius) may also be reckoned as chiefly belonging to the coniferous forests. The black grouse or black cock (Tetrao tetrix) may also be said to belong to the forest-district, even though its proper home is the border of the great forests, and the smaller woods in the plains.

The **level country region,** including small wooded districts and parks as well as open plains, embraces part of Svealand and the greater part of Götaland. Here is chiefly the habitat of the common fox. To the same tract belong the badger (Meles taxus) and the common hedgehog (Erinaceus europæus), while the roedeer or roebuck (Cervus capreolus) is found in the southern parts of the district, as far as Vester- and Östergötland. As belonging principally to the level country, we may mention amongst the birds: the common partridge (Perdix perdix), the kestrel (Falco tinnunculus), the hobby (Falco subbuteo), the long-eared owl (Asio otus), the skylark (Alauda arvensis), the tawny or brown owl (Strix aluco), the green woodpecker (Gecinus viridis), the nut-hatch (Sitta europæa), the jackdaw (Corvus monedula), the goldfinch (Acanthias carduelis), the linnet (Linota cannabina), the whinchat (Saxicola rubetra), together with the stock-dove (Columba œnas) and the ring-dove (Columba palumbus), both of which latter, however, are met with pretty far in the forests, the ring-dove being found even up in Jemtland. The landrail (Crex crex) is also chiefly distributed within this region, and the same is the case with several other birds, especially the wild duck. Together with this last bird, we find in the lakes of this district the coot (Fulica atra) and the great crested grebe (Podiceps cristatus).

In the most southern tracts of what has here been called the level country, viz. in **Skåne** and the neighbouring provinces, there occur, besides the greatest part of the forms above enumerated, a number of other species which, on their way to the north, have been compelled by climatic conditions to remain in these tracts. This is the case with the common stag or red deer (Cervus elaphus) and the fallow deer (Cervus dama), which, however, was not originally found wild in Sweden; the polecat (Mustela putorius), the common mole (Talpa europæa), a number of bats, and among the birds: the common stork (Ciconia ciconia), the common heron (Ardea cinerea), the kite (Milvus milvus), the rook (Corvus frugilegus), the crested lark (Alauda cristata),

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the common bunting (Emberiza miliaria), and the nightingale (Luscinia luscinia). The European or mute swan (Cygnus olor), too, has its chief habitat in the southernmost part of the country, but is also found pretty numerously in Uppland. As we have previously mentioned, the greater number of the batrachians of Sweden also belong to the most southern part of the country.

The animal life of Southern Sweden in former days was widely different from what it is now. Thus, in the peat-moors there have been found the bones of the wild reindeer as well as of the elk and the beaver, both of which have long ago wandered more north, and the latter of which now seems to be quite exterminated in our country. In the same districts there have also been found bones of the wild boar and of two great species of wild bulls: the aurochs (Bos primigenius) and the bison (Bison bonasus). The aurochs has long been extinct, but the bison still lives in Lithuania and on the slopes of the Caucasus. In the peat-moors of Skåne, bones of the fresh-water tortoise (Emys orbicularis) have been met with, but this animal is no more to be found here.

It now remains to cast a glance at the extensive clusters of **coast-islets** skirting Sweden. It is principally here that we find the common otter (Lutra vulgaris), although it often goes far inland along the water-courses. The birds which are characteristic both of the eastern and western coast-islets are, besides the common gull (Larus canus), which is also found on lakes here and there in the country, the lesser black-backed gull (Larus fuscus), the herring-gull (Larus argentatus), the great black-backed gull (Larus marinus), the common tern (Sterna hirundo), and a number of other terns; the arctic skua or Richardson's jæger (Lestris crepidata), the eider duck (Somateria mollissima), the black guillemot (Uria grylle), the oyster- catcher (Hæmatopus ostralegus), the turnstone (Strepsilas interpres), the ring plover (Aegialites hiaticula), the cinereous sea eagle (Haliaëtus albicilla), which, however, also breeds far inland, the raven (Corvus corax), and the rock-pipit (Anthus rupestris). On the eastern coast-islets are seen the razor-bill (Alca torda) and the velvet-scoter (Oedemia fusca), the latter also to be found in the lakes of Norrland. There also live, far out on the coast-islets, a number of birds previously mentioned, such as the crow and the wagtail. We may besides count among the inhabitants of the coast-islets the seals, of which one species, the ringed seal or »floe-rat» (Phoca fœtida), is found in the Baltic alone; the two other Swedish species, the grey seal (Halichœrus grypus) and the common seal (Phoca vitulina), being also found on the west coast.

Finally, the **rivers and lakes** of Sweden are rich in various fish, the greater number of which are edible. These, including the cray-fish, which is also the object of a remunerative fishery, are treated of in the article on the fisheries of Sweden. These waters also contain a wealth of larvæ and of smaller, inferior forms of animal life, prin-

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cipally crustacea of the entomostracan tribe, which is numerous also in the seas surrounding Sweden.

The water of the **Baltic**, which, at an early date, was a lake, has rather a small percentage of salt. The natural consequence is that only very few marine forms can have immigrated, so that its fauna may be said to be poor in species. In its islet-waters, however, there live a certain number of fresh-water fishes. In the southern part, where the water is a little more brackish, there are also a number of real sea fishes, of which the cod-fish (Gadus callarias) comes even far up into the Bothnian Gulf. Without a parallel, the variety of herring (Clupea harengus) known by the name of *strömming* and distributed also over the Bothnian Gulf, is the most important product of the fishing industry in the Baltic. Here, a small whale, the common porpoise (Phocæna communis), also at times roams as far as north of the sea of Åland. Among invertebrate animals there are but few forms in the Baltic, excepting entomostracans. Towards the Sound the fauna grows richer; and on the western coast of Sweden, in the Kattegat and the Skagerack, we find a fully developed marine fauna.

The Eagle owl.
From a picture by BRUNO LILJEFORS.

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II.

THE SWEDISH PEOPLE.

1. SURVEY OF ITS HISTORY.

The nation which at the present day inhabits the kingdom of Sweden is considered to have had its dwelling-place there for an unbroken period of at least six thousand years — a longer period than any other European nation can look back upon within its present boundaries, with the exception of the kindred race in Denmark.

There are traces of an earlier population than the present, one dating back from perhaps ten thousand years ago; but it is not possible to determine whether those tribes of hunters and fishers belonged to the present race, or to another. Since the beginning of the later **Stone-age** at least, Sweden has been uninterruptedly inhabited by its present race of *Swedes*, belonging to the Germanic branch of the great Arian family.

It is still a matter of debate whether these Arians entered the country from the south-east, perhaps from Asia, or lived along the southernmost shores of the Baltic. In the latter case, Germans must have inhabited southern Scandinavia from times immemorial or, at any rate, the earliest settlers must have arrived by the path pointed out to them by nature, across the Great and Little Belts and the Sound, into Skåne. From the name Skåne the whole of the North afterwards derived its name of Scandinavia. Subsequent colonization then first followed the west coast, owing perhaps to the rich salmon fishery of the rivers. By way of the Götaelf it reached the level country of Vestergötland; from thence, by way of Lake Vettern, to Östergötland, and from the northern end of that lake to the foremost district of Svealand, around Lake Mälaren. It would seem that the east coast did not become peopled until somewhat later on, its occupancy being due perhaps to the Baltic herring fishery.

For fishery has, from olden times, been a surer and a more plentiful source of food than hunting. In consequence of this, and because of the easy means of communication, the population of Sweden first settled around the navigable waters of the country. But even during the Stone-age its advance was the ordinary one: from fishery and hunting to the rearing of cattle and the commencement of agriculture. Every fresh advance meant the possibility of feeding a larger population upon the same extent of ground, and the tribe which effected such advance thereby gained an advantage over their more backward neighbours. The rela-

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tively high degree of culture reached by the inhabitants of the North as early as in the Stone-age, as proved by their fine tools and weapons, is best accounted for by the riches which flowed into the country in consequence of the trade in amber, which in the South was as highly valued as gold.

This wealth continued to flow into the North during a large part of the **Bronze-age** too, and under the influence of increased opulence, the manufacture of tools and of weapons was developed to a degree of artistic skill that was only afterwards equaled in the lands bordering on the Mediterranean. Bronze seems to have been more generally introduced into Sweden about 1750 B.C., and then, probably, in exchange for the much sought-for amber. The economical development which made this artistic skill possible pre-supposes, in its turn, the existence of a comparatively well-ordered social organization, due, as usual among the earliest Arian peoples, to a gradual development from the restricted internal relationship of the family to the wider circle of the community. The existence of such communities is also proved by the enormous stone graves which must have required the systematical co-operation of hundreds of people for their erection.

It is not until during the **Iron-age** (from the year 500 B.C.) that our nation first appears upon the stage of *history*. Iron came from the South, as bronze had done, by the trade-routes which took their course through Europe along the great rivers, and new cultural influences followed in its track. It was now — the exact date is still uncertain — that runic inscriptions first arose, as an imitation of the alphabetical writings of southern nations. Already there were cultivated tracts around Lake Mälaren and far north towards the shores of the Gulf of Bothnia. From what we can judge, the culture of Sweden at that time must have closely resembled that of the Germans who first encountered the armies of Rome, as described by Cæsar and Tacitus. The formation of communities grew in ever wider and wider circles; from the family to the hundred («härad») and from that to the county or province. The earlier phases of this development must, certainly, be dated much farther back than the time usually supposed, but the formation of communities has proceeded during a continued sequence of disturbing interruptions. According to the conception of right early developed among the Teutons, heads of the clans and kings considered their territories as the free-hold or possession of the family. This possession was inherited in accordance with the same rules that held good for other allodial property, in such wise that also younger sons had to have a share in the inheritance. As soon, therefore, as a father had more than one son, it became an impossibility to keep the kingdom together, and the Ynglinga-Saga describes how the earliest realm in Svealand became rent by incessant divisions among brothers.

When the clans of the North first began to congregate into *larger kingdoms*, it was natural that those tracts confederated between which water formed a means of communication. The sea united, whilst mountain and forest divided, and thus the Danish realm gathered about the Sound and the Great and Little Belts, and the *Swedish* about Lakes Mälaren, Venern, and Vettern, whilst the isolated mountain valleys of Norway were the last to attain national unity. We know, from early English sources, that about A.D. 500 there ruled in Svealand a race named *Skilfingar*, which, by means of conquests, extended its rule towards Götaland. When our own traditions first attain to any degree of credibility, the territory of this race had already fallen into small states, which corresponded pretty nearly to our existing provinces. But still there was at *Uppsala* a great and much honoured *God House* looked up to by all the kings and people of Sweden. By degrees, this God House acquired ever greater estates throughout the whole country, and, without any other dominion than these estates, its ruler was at last able to defy the petty monarchs of the country. By guile and by force, king *Ingjald* gained possession of their kingdoms, thereby laying

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the foundations of **the actual Kingdom of Sweden.** It is difficult to determine the date of this event, but it was probably about A.D. 700. The kingdom of Sweden as an undivided whole is thus, at the present moment, about 1,200 years old, and is consequently older than any other state now existing in Europe.

The extent of the Swedish kingdom at that time, did not quite coincide with that of Sweden at present; the most southern province, Skåne, belonged to Denmark, as did also the province of Halland. The northernmost parts of Sweden, too, were scarcely then taken possession of, only a few solitary Lapps finding their scanty subsistence there.

The ancient Uppsala- or «Ynglinga»-dynasty ruled the kingdom of Sweden uninterruptedly till about the year 1060. To this time belongs that period in the history of the North which was so important to the whole of Europe and which is called

the **Viking Period** (A.D. 700/1060).

The inhabitants of the North had from times immemorial made voyages from their extensive sea-coast to the neighbouring countries. But an improved method of constructing their ships, which made it easier and safer to employ sails, caused these voyages to be extended to far greater distances. From the close of the first decade of the 8th century, the fleets of the Vikings swarmed round all the coasts of Europe, as far as to the Straits of Gibraltar, where the mighty power of the Moors set a limit to their advance, which had spread fright and horror wherever else their ships appeared. At home, a forced service at sea was instituted, which, rendering communication along the coast more easy, powerfully contributed to hold together the kingdoms once formed. A lively intercourse had, from very early times, existed between Sweden and the countries at the North Sea and the Atlantic — as shown by runic monuments chiefly found in Vestergötland — but still more lively was the communication with the countries round the Gulf of Finland, where a numerous Swedish population had been established for some thousands of years. The contact with the mother-country now became very much livelier, and the trade with Asia, between the Baltic and the Caspian Seas, which had arisen in the time of the Caliphate, enticed the Swedes (*the Varingians*) up the great rivers, further and further into the eastern continent, whose loosely connected tribes could not resist their march. By the year 862, the Varingians had founded a dominion here, which, however, soon fell to pieces again; but in a short time messengers came to Sweden — probably from the Swedes who had remained in the East — demanding chiefs. It was then that Rörek (or Rurik), at the head of «all the Rus» — i. e. the entire Swedish contingent of enlisted Sea-warriors of the east coast («Roslagen») — founded a dominion around Lake Ladoga and the city of Novgorod, which from his warriors — «rodsmännen» — gradually obtained the name of *Russia*, and soon extended over the greater part of eastern Europe. From thence, the Viking fleets pursued their way down to the Caspian, while Swedish Varingians in great numbers offered their services to the Emperor of Byzantium, and to the King of Georgia.

The expeditions of the Vikings accelerated in a high degree the introduction of Christianity into the North. In the year 829, St. Ansgarius came to Sweden, sent by the king of the Franks. The Christian mission which was founded by him in the heart of the country, at the royal town of Birka, on an island of Lake Mälaren, could not survive, however, surrounded as it was on all sides by pagan territory. The great House of Gods in Uppsala was too near; as high-priests who directed the sacrifices there, the kings could not be favourably disposed towards a doctrine which threatened the very foundations of their dominion.

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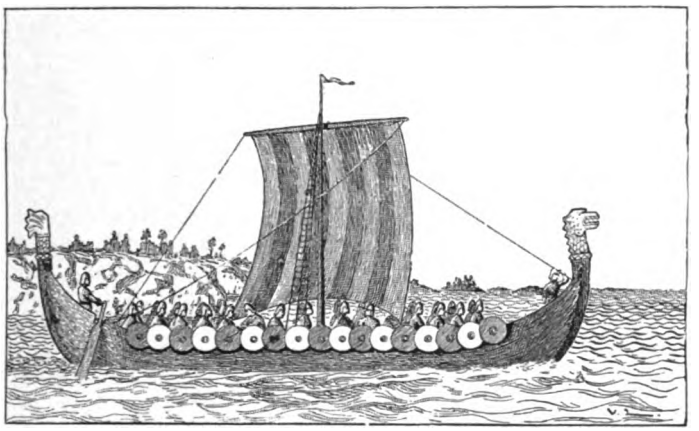
Nearly two hundred years passed away ere Christianity once more gained a secure foothold in Sweden, by way of the more favourably situated province of Vestergötland.

During this time, the northern kingdoms grew in power, and there was temporarily formed, in northern and eastern Europe, a highly developed political system, somewhat resembling that of modern days.

About the year 1000 Sweden got its first Christian king, who bore the name of *Olof*. After this time Christianity gained a firm footing in the country, and never more suffered itself to be expelled from the land. But, as a consequence, the king was placed in a false position. The basis of his power was his quality of being the one who had to direct the sacrifices at Uppsala. It is uncertain whether the king ceased to direct these sacrifices, or continued to do so, in spite of his baptism. But in the former case his position must have been threatened among the pagan, in the latter among the increasing Christian population. The old Uppsala race of kings died out with the sons of Olof — after the year 1050. Its last ruler, Emund Gammal, vigorously tried to defend his position against ecclesiastical pretensions, which grew in the same degree as the power of Christianity increased; but during this struggle he could not prevent the province of Blekinge being wrenched from Sweden — to which it had belonged of old — in order to be united with Denmark.



A Viking ship.

The Viking Period gives one the impression of having been one of real greatness, but its enormous display of strength had really sapped the power of the nation to a high degree, the numbers of which had diminished, not least owing to emigration to the tributary states in the east. The encounter with Christianity, which after the time of Charlemagne had spread through northern Europe with irresistible power, had had a disastrous influence upon primitive northern culture. The belief in the Asar (the old northern gods) had died out in many minds, without being replaced by any Christian belief. But, at the very moment of its death, the ancient belief evolved a poetic conception of transcendent beauty. In resemblance to earthly conditions, the ancient Odin was imagined as enthroned in Valhalla, a celestial Grand Monarch with his counsellors and his court. But in the end, this Odin and his fellow-gods did not satisfy the moral demands of their worshippers, and were therefore doomed to downfall.

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The Catholic Period (1060/1523).

The Period of Transition embraces the years 1060/1250. It is marked by long and severe internal conflicts, chiefly between Christianity and Paganism, but at the same time also between the different provinces: between the inhabitants of Uppland, of Östergötland, and of Vestergötland, who could not agree on the question of succession to the throne. During the course of these strifes, the kingdom by degrees became an *elective monarchy*, in which the *people of Uppland* had the acknowledged right to choose a king, who should afterwards be approved by the *Thing*, or Parliament, of the other provinces. It was, however, difficult for this new arrangement to take firm root and it was subjected to many violations.

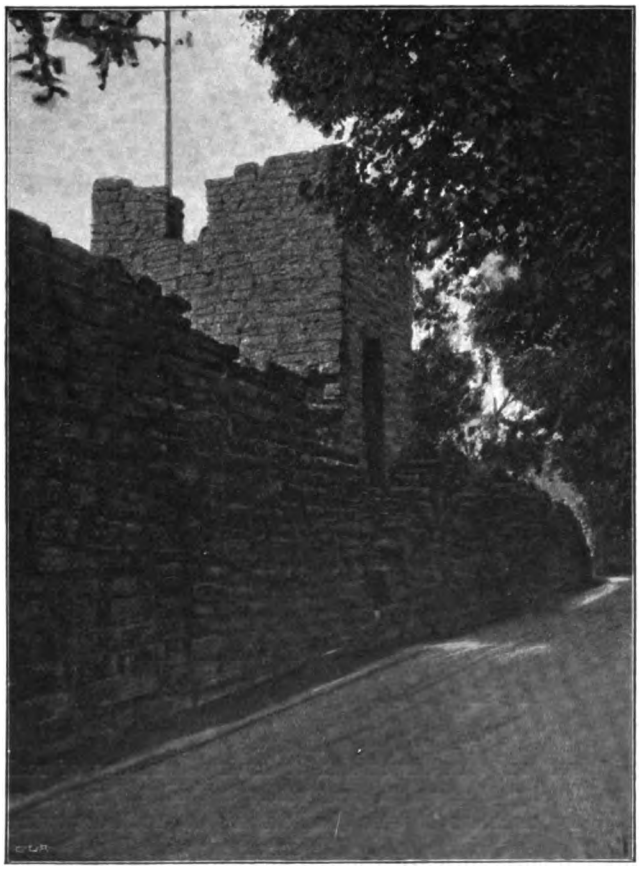

Photo. K. Sidenbladh j:r.

Portion of the Visby town wall. (*Island of Gotland.*)

It seems as if, at the beginning, a powerful family in Vestergötland, called from its first king the *Stenkil Line*, had no difficulty in taking possession of the throne of the old kings, with whose race the Stenkil family was related on the female side. *Inge*, the son of Stenkil, endeavoured, in obedience to an order from the great Pope Gregory VII, to hasten the conversion of the pagans, but only succeeded in irritating them to opposition and a renewed demand that he should carry out the sacrifices to the gods, which had of old been a duty of the kings. At first he was vanquished and had to retire to the province of Vestergötland — by this time an entirely Christian province — but soon succeeded in attacking and killing the pagan king *Blotsven*, his opponent. This royal family seems, however, to have periodically upheld its power, at least in its native province of Östergötland; and great internal divisions prevailed, in consequence of which Sweden had to surrender Jemtland and Herjedalen to Norway in 1111.

The Stenkil Line became extinct before 1130. By that time, the power of paganism seems to have been broken, but the irreconcilableness of the three chief tribes and of their claims still remained. The male descendants of Blotsven, the

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Sverker Line, with headquarters in Östergötland, competed for the crown during a century with his descendants on the female side, the *Eric Line*, with headquarters in Svealand, whilst the people of Vestergötland leaned, for a time, towards Danish princes who descended, by the female side, from the sons of Stenkil. Sverker and his descendants had now become more earnest Christians and advocates for the claims of the Roman Church, which were confirmed in the year 1200 by the exemption of church-estates from taxation, and of clergymen from temporal jurisdiction. In opposition to this, the line of *St. Eric* seems to have wished to build up the church upon a national foundation, Eric himself being proclaimed a saint by the people only, never by the pope. By means of a crusade to Finland (before 1160) a beginning was made by him towards the introduction of Christian Swedish culture into that country, and towards the restoration of the Swedish dominion on the other side of the Baltic, which had been lost during the period of religious conflict.

Varnhem Church. In Vestergötland.

In course of time Christianity won a complete victory in Sweden. The whole country was divided into ecclesiastical districts — parishes and dioceses — and by degrees papal law pushed victoriously forward, celebrating its final triumph at the synod of Skeninge in 1248. Thus Sweden was the last great country in Europe that bowed beneath the dominion of the Roman Church, and this at a time when the papal power had already seen its most glorious days. Thus the Catholic hierarchy never reached its full power in Sweden, but it has, instead, the merit of having abolished many old pagan abuses; and the monasteries which arose in different parts of the country, successfully endeavoured to introduce gentler manners, and a better cultivation of the soil.

By degrees, extensive changes took place in the life of the people. *A class of land-owning nobles* gradually emerged, as in the rest of Europe, out of the old peasant aristocracy, and it gained greater and greater power in opposition to the peasants, who had, of old, formed the flower of the people, and had had a decisive voice at the Thing meetings. Above them all rose the *Folkunga Line*, a

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gifted but turbulent family in Östergötland, which soon gained the highest dignities of the state, and made and unmade kings.

The period of transition in Sweden just described — first from Paganism to Christianity, then from a confederacy of small states into a homogeneous kingdom, and, finally, from an ancient Germanic peasant society to an aristocratic and hierarchal one — must have been a time of great unrest, but unfortunately the sources of our knowledge of the period are very scanty. As on so many other occasions in Swedish history, great conflicting principles had to be fought out during centuries, while the result of the struggle was not appreciably hastened by the dictation of any central authority or foreign power. As a consequence of the aftereffects of the Viking raids, and owing to the incessant intestine conflicts, this period was undoubtedly one of weakness. Amongst noteworthy personages of the epoch, we may mention: the Catholic patron saint of Sweden, *St. Eric* (see above) and our greatest missionaries after Ansgarius, *Sigfrid* and *Stephan*, Germans; *Eskil* and *David*, Englishmen; and *Botvid*, a Swede. Amongst remarkable events we need only mention *the great battle at Lena* in Vestergötland (in the year 1208), where an army of Danish knights, called into the country by one of the pretenders to the throne, was almost completely annihilated — an event which survived in tale and song for centuries in the memory of the people. That a rich intellectual life was present in our nation, at least at certain times and in certain places, is proved by the fact that a great number of the Swedish *popular ballads* probably originated during this period.

At the close of the period a beginning was made towards the re-conquest of Finland; but not all the present Sweden then belonged to the country, Skåne, Halland, and Blekinge forming part of Denmark, and Bohuslän, Jemtland, and Herjedalen belonging to Norway. And a great part of northern Sweden (with the exception of the coast-district) must have been a mere desolate region.

The Folkunga Period (1250/1389). Under the Folkunga Line, whose most important personage was *Birger Jarl*, who ruled Sweden as Protector during the minority of his son Valdemar (from 1250/1266), Sweden entered into closer relations with the rest of Europe. It had now quite settled down into the new conditions brought about by the introduction of Christianity, and the community more and more assumed the same forms as in other countries. The peasant aristocracy as formerly existing gave way completely to a thorough division into classes, in which the *Church* appeared as a state within the State, and the *Nobility* rose above the people, whose right of decision it commenced to usurp at the diets of the lords, while its principal men, in the quality of *Counsellors of State*, surrounded and, not seldom, ruled the king. The *towns* and their citizens developed by means of a livelier internal and foreign trade. Communications with foreign lands were brought about mostly by means of the Hanse towns, from which a number of Germans migrated into Sweden, and there laid the foundation of a mining industry.

Within the country great activity prevailed in the field of legislation, under the direction of the Kings. Here, too, general European standards of justice entered; the position of women became ameliorated, and thraldom was abolished. The laws of the old provinces were committed to paper, and collected, in 1347, into one general state law which, at the end of the same century, was accepted by all the provinces. Thus, a great step was taken towards uniting the ancient Swedish confederacy of provinces into a single state. Nobility was secured by the introduction of military service by Magnus Ladulås (about 1280), by which mounted military service conferred exemption from taxation, and landed estates were given in payment for service to the state. An organized, hereditary feudal system, in the general European form, was not established, however, and feudalism happily never won footing in Sweden.

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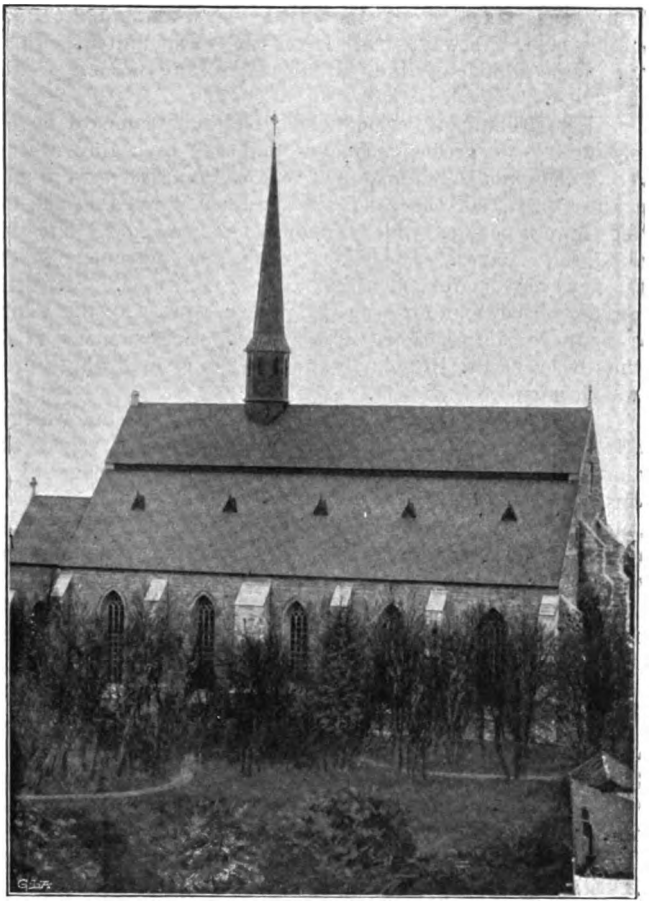

Vadstena Church. In Östergötland.

The southernmost provinces (Skåne, Halland, and Blekinge) were joined for a short time to Sweden, but in want of roads, they were of necessity, on account of the lively communication across the Sound, cast upon Denmark, under whose rule they soon came again. But as mistress of both shores of the Sound, Denmark could, at will, favour or arrest the maritime intercourse of Sweden with foreign parts, and the relations of Sweden to Denmark were, for centuries, one continual conflict on account of the Sound. In order to secure other roads outwards, Sweden was obliged to cultivate friendship wtih the Hanse towns and the Counts of Holstein, and the family ties knitted by the kings with Holstein, Denmark, and Norway alternately, mark the course of Sweden's foreign policy. Towards the East, Birger Jarl (before 1250), and Torgils Knutsson (before 1300), pursued the conquest and christianizing of Finland, but, being opposed by the powerful Great Novgorod, did not succeed in restoring the ancient influence of Sweden in Russia.

A lasting source of internal weakness were the unhappy *fraternal quarrels*, caused by conferring, in accordance with an ancient Germanic custom, dukedoms upon the younger brothers of the kings. These conflicts weakened the royal power, at the expense of which that of the nobility increased. During the reign of the well-meaning *Magnus Ericsson*, who was popular but weak, the great lords became so powerful that they at last deposed the king and his line and called in *Albert of Mecklenburg* (1363/89), a German relative of his, in order that, under his rule, they might govern just as they pleased. The reign of Albert was the period of the greatest impotence of the monarchy, and of the highest but not the most honorable power of the nobility. It happened that, at this time, the ancient royal lines in the three kingdoms of the North almost simultaneously became extinct, and the right of succession to them all fell upon a woman, Queen *Margaret* of Denmark. The Swedish nobles, who were discontented with king Albert, offered her the crown of Sweden, and after Albert

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had been defeated at the battle of Falköping (1389), the three kingdoms of Sweden, Norway, and Denmark were united. This was the beginning of the last period of the Middle Ages in Sweden — the Kalmar Union as it is called.

The Folkunga Period, which had now come to an end, had been much more productive of great personages than the preceding centuries in Sweden. *Birger Jarl*, *Magnus Ladulås*, and *Torgils Knutsson* were all prominent and imperious natures and, at the same time, animated by a desire to promote the welfare of the lower people, which, indeed, was a rare thing in other countries during the Middle Ages.* The most celebrated personage in Sweden during the period is, however, a woman, *St. Bridget* (Birgitta). St. Bridget is, indeed, the first Swede, either man or woman, since the days of the Viking expeditions, to become a figure of international importance. Her memory is associated primarily with the Order of St. Bridget, founded by her, and whose principal convent in Sweden was located at Vadstena.

Of the events of the period, the most noteworthy was, incomparably, the »Great Death», or the Black Plague, which raged throughout Europe about the year 1350. Its ravages in the North seem to have been destructive in an unusually high degree, even if one allows that the contemporaneous accounts must be considered as exaggerations. It is, however, a fact that, in some places at least, the cultivation of the soil at this time underwent such a retrogression that it could not recover for centuries after.

The boundaries of Sweden proper at the close of the period were unchanged from those given on page 74. The conquest of Finland was, on the contrary, now completed.

The Kalmar Union (1389/1523). The Union of the northern kingdoms at this time was, as Geijer's famous phrase expresses it, «an event that *looked* like a thought». The three kingdoms were certainly very closely related in language and manners, but they each went their own ways in the main, Denmark having its principal interests to the south, Norway to the west, and Sweden to the east. The great distances also formed a great hindrance to the realization of unity. What, under other circumstances, might have been won by this approach to a union, was therefore not gained, and at the dissolution of the union, the three nations separated with but an increased feeling of independent distinctness, at least as far as Sweden and Denmark were concerned.

The very next successor of Margaret, *Eric of Pomerania* (1412/1439), by his acts of feudalistic usurpation, and the unbearable oppression exercised by his Danish bailiffs, caused a rising of the peasantry of Sweden, which ended with the deposition of the monarch, who finally lost Denmark and Norway too. This popular insurrection (1434/36) under the leadership of the noble *Engelbrekt*, is one of the most important events in Swedish history. In fact, it was then that the national consciousness of Sweden was brought to life. The small provincial dominions, with their separate interests and mutual jealousies, disappear from its annals, and *a united self-conscious Swedish nation* appears for the first time upon the stage of history.

From this time onwards, the rest of the Kalmar Union Period presents the spectacle of almost unbroken strife between Sweden and Denmark, now upon the field of battle, now again at numberless diplomatic negotiations and meetings. The natural, fundamental principle: that the king should be chosen by the three

* The name »Ladulås», given to King Magnus, means »a lock for the (peasant's) barn», and refers to the legal protection given by the king to the peasantry against the rapacious higher classes — undoubtedly one of the most beautiful by-names ever received by a king.

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nations together, was continually put aside by the Danes, who chose the king themselves, and then tried to force his acceptance upon the two other nations. Then there arose in Sweden two parties, one in favour of the Danish kings, and the other a national party, which desired to hand over the government of Sweden to Swedes — forming a kind of provisional administration and bearing the name of «Protectors of the Realm». At the head of the latter party there were often members of the two *Sture* Families, and they looked for support to the peasantry of Sweden.

The great national awakening, which thus rallied the Swedish people to fight against the Union, powerfully contributed to the development of the culture and social conditions of the country. The peasant had incessantly to defend his own liberty, and that of his country, weapon in hand, and it followed therefore, as natural consequences, both that he successfully retained the seat and vote he had previously had in the Riksdag (or Parliament), and also that the influence of the Estate of the Peasants at these meetings was often the predominating one. With this secure basis for their power, the Stures were, so to say, uncrowned kings, and under their hands the fabric of the Swedish commonwealth was built up on an ancient national foundation. For the most part, they were also able to bid defiance to the Danish kings, even when the latter received the help, as not unfrequently happened, of an important part of the Swedish Nobility, and of the Church.

Kalmar Castle.

After the last Protector of the name of Sture, or *Sten Sture the Younger*, lost his life in 1520, in a battle against King *Christian II*, the last-named monarch once more succeeded in restoring the Union. But in consequence of the mad deeds, which began with the «Massacre of Stockholm», and occasioned several hundreds of the best men of Sweden to be treacherously put to death, he made his rule so detested that, in a few months, the whole of Sweden was again in a state of insurrection. This time it was the renowned *Gustavus Vasa* who placed himself at the head of the rising to attain liberty, and with the successful completion of the war, and the proclamation, in 1523, of Gustavus Vasa as *King* of Sweden, the days of the Kalmar Union were past for ever.

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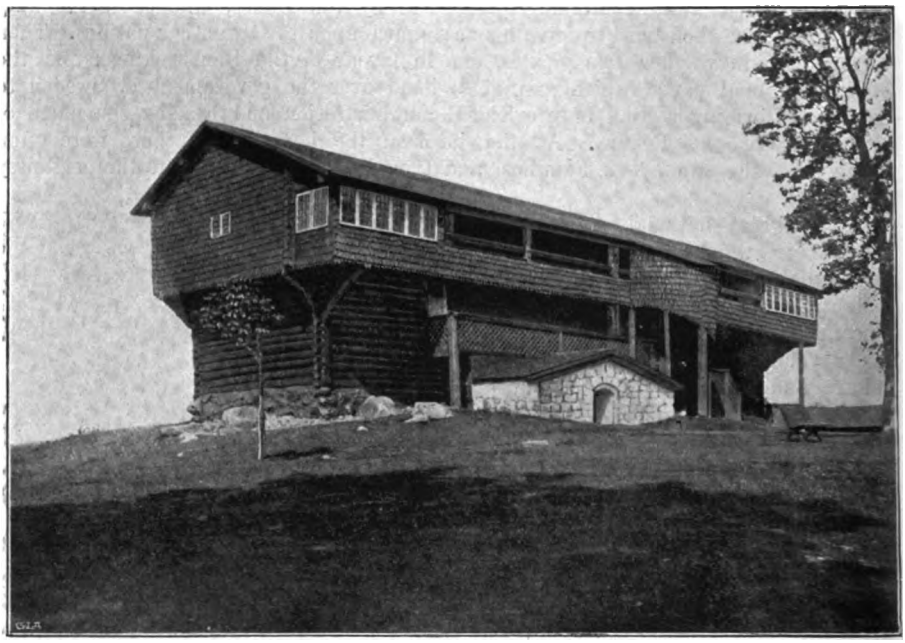

Ornäs cottage. Wooden house in Dalarne, from the 15th century.

The period we have just described belongs, without doubt, to the most romantic epochs of our history. The *Peasantry's Period of Greatness* (1434/1543) is not less full of general human interest than the almost contemporaneous and similar period in Switzerland, although not so well known as that. The constant warfare, indeed, waged against external and internal foes of the realm often possesses dramatic qualities worthy of the genius of a Shakespeare to describe them. During a time when in the rest of Europe chivalry was already on its decline, it flourished again in Sweden with a beauty yet further increased by the circumstance that the knight came into close union with the lowest ranks of the *people*, put himself at their head, and, by their aid, successfully championed the cause of a common fatherland. Such figures of true romantic beauty as that of *Sten Sture the Younger*, who was in truth a knight «sans peur et sans reproche», are seldom to be found in history; and his spouse, *Christina Gyllenstierna*, stands worthily by his side, equal in courage and greatness of soul to any of the most celebrated women of history. During this period Sweden produced such statesmen and commanders as *Engelbrekt* (one of the brightest figures in the story of the world), and *Sten Sture the Elder*, under whose rule of nearly thirty years the intellectual development of Sweden made extraordinary progress. It was during his time that Sweden obtained its first university, that of Uppsala (1477), which is, moreover, the oldest in the whole of Scandinavia.

Of the many and varying events during this period, the murder of Engelbrekt, by a treacherous envier (in 1436), and the *Battle of Brunkeberg* (1471) have fixed themselves most indelibly in the national memory. The battle just mentioned, which was fought by Sten Sture the Elder within the present limits of the city of Stockholm, ended in the complete victory of the Swedish army over the Danish King, and secured for our land twenty-five years of peace, a thing without parallel during the Union period. In the general enthusiasm at

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Vadstena Castle. At Lake Vettern. Photo. FR. KLEMMING, Stockholm.

this success, the people also rid themselves of an old dependency of the *Germans*, by repealing the stipulation which had hitherto held good: that one half of the governing body in every town should consist of Germans. That such a condition of things could ever have come into existence, clearly shows how undeveloped the *economical* life of Sweden still was. In this matter Sweden followed the lead of Germany during the whole of the Middle Ages, and it was Gustavus Vasa who first created, in this as in almost all other respects, a perfectly independent Sweden.

The exterior *boundaries* of the country remained unchanged during the whole of this disturbed period. The island of Gotland, however, repeatedly fell into the power of Denmark, and was formally surrendered to that country during the next period (in the year 1570).

Modern Times
(from 1523 onwards).

The Period of Sweden's Re-birth (1523/1611). The line of the *Vasas*, which now ascended the throne of Sweden, is one of the most gifted and one of the most illustrious and celebrated families known to history, and *Gustavus Vasa* (1523/60) is one of the foremost figures amongst the great rulers of the world.

His services to Sweden may be very briefly expressed by the word given above — *Re-birth*. He rallied once more our half annihilated nation, he freed it from its *political* dependence upon Denmark, its *economical* dependence upon the Hanse-towns, and its *ecclesiastical* dependence upon the papal power. The traces of nearly a century of warfare were obliterated by newly awakened, peaceful industry, and under Gustavus Vasa Sweden, for the first time, assumed its position as a distinguished member of the European political system.

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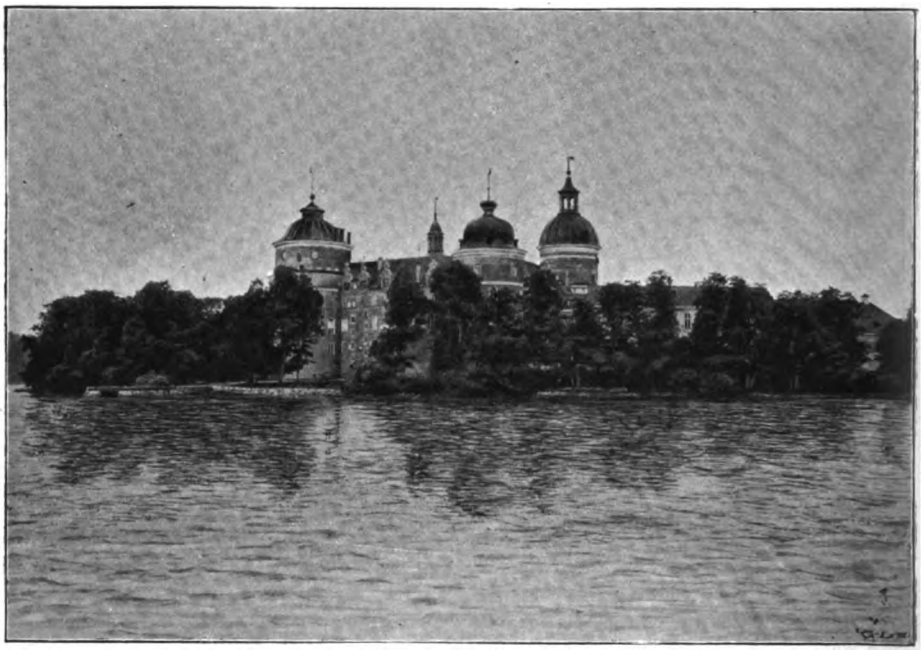
In carrying out all this the king, by reason of his personality, remained an object of the undisguised reverence and love of his people. In spite of a certain hastiness of temperament and an excessive patriarchal omnipotence, «Good old King Gösta», both to his own contemporaries and to posterity, was the beau ideal of a Swedish king, and his figure — far less familar to foreigners than those of his famous successors, Gustavus Adolphus the Great, and Charles XII — has not at all been overshadowed by theirs in the memory of the Swedish nation.



Gripsholm Castle. At Lake Mälaren.

In 1544, King Gustavus succeeded in making the kingdom of Sweden *hereditary* possession of his family, but, in accordance with the ideas of the times, hereditary power presupposed the right of younger sons to a share in that kingdom. This caused bloody internal feuds amongst the descendants of Gustavus Vasa, and the kingdom thus weakened was only restored to order again by his youngest son *Charles IX* (1599/1611) — another ruler of the first rank, a new «Protector» of the old Sture type, and like the Stures preeminently a man who relied on the people. For several years before his accession to the throne he was the actual regent of Sweden, and at the Ecclesiastical Synod at Uppsala (1593) brought about the *definite victory of the Reformation over Catholicism.* The division of the kingdom among the royal princes ceased under the reign of his son, Gustavus Adolphus, in this respect as in so many others a pioneer; a new principle, based upon the Renaissance and (indirectly) upon antiquity, was now enunciated, whereby the indivisibility of the state was secured, and by this means one more great incentive to disunion removed.

Immediately after the middle of the 16th century, our country had again embarked upon the acquisition of land on the other side of the Baltic. As a consequence of the Reformation the Livonian Federal States, which had been

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established on a Catholic foundation, fell to pieces, and from the year 1561 the adjoining countries began to contest with one another for the prize. Sweden could not permit it to fall into the hands of barbaric Russia, nor of Poland, which was under the sway of the Jesuits, nor into those of jealous Denmark, which was ever brooding upon the re-establishment of the Union; hence, out of mere consideration for its own safety, Sweden was compelled to seize as large a share as possible of the Livonian heritage. A consequence of this, again, was that protracted conflict for the *mastery of the Baltic*, which carried Sweden to the height of its power, and to the brink of destruction. The mastery of the Baltic was a necessity for Sweden at a time when ways more frequently led across the sea than over land, and when it was much easier to go from Stockholm to Riga than to Småland or Vestergötland. The more immediate consequences of all these new complications begin, however, only during the next epoch — the period which commences with the accession of Gustavus II Adolphus to the throne, and ends with the death of Charles XII outside Fredrikshald.

Compared with the highly agitated period of the Union, the 16th century does not present many great and interesting personages in Sweden below the throne. Moreover, the intellectual advance during this time was not so considerable as were the economical and the political. The great work of the period in the intellectual world, the Reformation of the Church, did not bear its best fruit until during the following century. Amongst those who completed the work of the Reformation in Sweden there ought, however, always to be remembered *Olaus Petri*, one of the noblest characters in Swedish history, and one that has been of the greatest importance for the nation, not only in things ecclesiastical, but also in the domain of literature. Sweden's two greatest naval heroes, *Jakob Bagge* and *Klas Horn*, also belonged to this period.

The outer *boundaries* of Sweden underwent two changes during this time, Estonia being acquired in 1561, whilst, on the other hand, the island of Gotland was surrendered to Denmark in 1570.

Stockholm. About 1650.

The Period of Sweden's Political Greatness (1611/1718). In order not to break the thread of the history of Sweden, we are accustomed to count the beginning of this period from King Gustavus II Adolphus' accession to the throne (1611), although it ought, of course, more correctly to be dated from his appearance on the theatre of the great European war, in 1630.

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The rulers of Sweden during this 17th century, which was so noteworthy for the country, were: *Charles IX* (1599/1611), *Gustavus II Adolphus* (1611/32), *Axel Oxenstierna*, as the head of the regency during the minority of Queen Christina (1632/44), *Christina*, as ruling sovereign (1644/54), *Charles X Gustavus* (1654/60), the Regency during the minority of Charles XI (1660/72), *Charles XI* as ruling sovereign (1672/97), and *Charles XII* (1697/1718). The history of the world cannot often show such a succession of great personalities as successive leaders of the destinies of one nation. There is but the second Regency (1660/72) which gives an impression of insignificance, and the term of its rule marks a noticeable weakness in an otherwise brilliant picture. The personality and fate of *Gustavus II Adolphus* and the story of Sweden during his reign belong to the history of the world, and they are more generally and better known than are the events of any other period in our history; we need not, therefore, enter into any details. His appearing upon the scene of the great continental war was quite as much a measure of self-defence on the part of the Swedish nation against the far-reaching plans of Wallenstein and the Catholic princes to obtain the mastery of the Baltic and its shores, as a noble assistance rendered to the coreligionists of the Swedish people.

Riddarhuset (The House of the Nobility) in Stockholm. Statue of Axel Oxenstierna.

The victory of *Breitenfeld* (1631) at once raised Sweden to the rank of a Great Power. Its new-won position was threatened, it is true, by the death of the hero-king upon the field of Lützen (1632), but it was saved by the political genius of *Axel Oxenstierna* and the illustrious warlike deeds of the Swedish generals, which, even during the latter phases of the war, assured for Sweden a far more important position than some foreign writers are accustomed to acknow-

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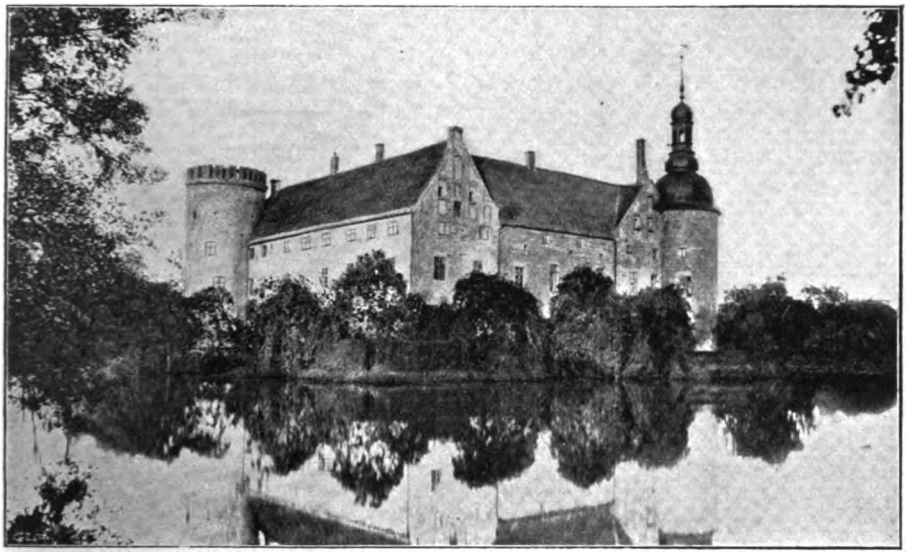
ledge. At the close of the lengthy conflict (1648), Sweden was master of the mouths of all the German rivers and of the greater part of the shores of the Baltic.

Almost simultaneously with these events, Sweden succeeded, by the peace of Brömsebro (1645) and by that of Roeskilde (1658), in acquiring the provinces of Skåne, Halland, Blekinge, Gotland, Bohuslän, Herjedalen, and Jemtland, which had hitherto belonged to Denmark or Norway. This was an immensely valuable territorial acquisition, which increased the Swedish population by almost one third and gave the country the boundaries which, under modern conditions, must be termed its only natural ones. And of all the territorial acquisitions made in its period of political greatness, these also are the only provinces that Sweden still has in her possession.



Vidtsköfle Castle, in Skåne.

In 1658 the Swedish power had reached its highest point. Even after some cessions had been made in 1660, it embraced the whole of present Sweden and Finland, and in addition, Esthonia, Livonia, a part of Ingria, Citerior Pomerania, Wismar, Bremen and Verden — a total area of 900,000 sq.km., with a population, then, of about 3,000,000 people, corresponding, at the present time, to about 11,000,000 inhabitants.

The mighty wars it had fought, and the position of a Great Power which it had so unexpectedly acquired, were not without a marked ascendency over the *internal* conditions of Sweden. The multifarious increase of communication with abroad gave evidence of its effect by the great influence it had upon Swedish intellectual culture, then commencing to flourish, and which was promoted to a high degree by the enlightened care and interest of Gustavus Adolphus, Axel Oxenstierna, and Charles XI. The position of Sweden as a military power was purchased, however, by its people, at the price of heavy economical sacrifices, and the common people could only with the greatest difficulty endure the heavy burden of taxation and the continual recurrence of military conscriptions. The nobles enriched themselves to a great extent by means of the war, and continually in-

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creased their power as well as their riches. Lordly castles, filled with foreign booty, arose in all parts of the country, and the fiefs which the nobles received in payment for their services to the country, made them masters of a share of the land which was continually increasing in extent. The *Edict of Reduction* (or Compulsion, Forfeiture), whereby the estates of the nobles so obtained reverted to the Crown, became at last an inevitable necessity, and this tremendous economical revolution, which completely broke the power of the nobility and transformed its members, in a considerable measure, into a nobility of state officials, was carried out in due legal form by Charles XI. The constitution of the *Church* was fixed at the same time, and its clergy reached the height of their ecclesiastical and political greatness during the 17th century.

Skokloster Palace. At Lake Mälaren.

Radical changes were made in the *Form of Government*. Gustavus Adolphus prepared, and Axel Oxenstierna carried out in 1634, the reform of the administration, which made national unity complete, and placed at its head a monarchical power, supported by a powerful *Council*, composed of the chief representatives of the highest noble families and forming an excellently organized ruling body or board. The balance of power within the State was sometimes disturbed to the advantage of the nobles, owing to the great wealth of that class, and also to the increased influence accruing to the Council during the long regencies. But the kingly power had everywhere emerged from the thirty years' war with increased strength, and royal absolutism soon made its triumphal march through Europe: Sweden could not long remain untouched by this movement. The great extremities in which the state found itself after the wars entered upon by the feeble Regency during the youth of Charles XI, aroused a general ill-will against the Council and nobility, and the powerful measures which were found necessary for the rescue

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of the country could not be carried out without a royal absolutism, which under these conditions almost assumed the character of an ancient Roman dictatorship. Absolutism was introduced soon after 1680, also in a legal manner, and Charles XI devoted himself, with the strictest conscientiousness, to the welfare of his kingdom. — The absolutism then introduced did not, however, imply the abolition of the Riksdag, which underwent a rather important development during the 17th century. Still, it was never once called together by King Charles XII.

The position within the political system of Europe to which, during this time, Sweden had been raised, has been of immeasurable importance in the history of her national development, though in itself it was out of all proportion to the numbers and material resources of the nation, and it was but natural, therefore, that it could not be retained long. The downfall occurred during the reign of that famous monarch *Charles XII*, as a result of the so-called Great Northern War (1700/21). The titanic wars of Charles XII — finally against the whole of northern and eastern Europe — gained for him the admiration of the world, and he was followed by his people, upon whose powers of self-sacrifice he made almost superhuman demands, with a devotion as unswerving in adversity as in success. The wars and sufferings of Sweden and Finland during this period are, without doubt, among the most touching incidents the history of the world has to tell of. The final result of the conflict with such an enormously superior force was, of course, never doubtful, but the period of political greatness of Sweden has not therefore been in vain. The Swedish nation can not be robbed of the imperishable glory of having saved, at a most critical moment, for all humanity, the holy cause of *liberty of conscience*.

By the treaties of peace which concluded the Great Northern War (1720 and 1721) Sweden lost its possessions east and south of the Baltic, with the exception of the northernmost part of Pomerania and the town of Wismar; the south-eastern part of Finland was also lost. Sweden had then ruled for about 150 years in Esthonia, almost 100 years in Livonia, and about 65 years in southern Pomerania. However comparatively short these epochs may be, the Swedish rule has nevertheless left its marks. It survived in grateful memory almost everywhere amongst the lower classes of the population, at that period so often repressed and down-trodden elsewhere. The excellently ordered Swedish administration was clearly taken as a model by the nations (Prussia and Russia) that succeeded Sweden as the possessors of the above-named countries; and the nobility of Livonia is indebted in the main to the political education it received from Sweden of that time for the influential position they assumed in the history of Russia throughout the whole of the 18th century.

The 17th century marks, indeed, for Sweden a period of energy and expanse unknown before. We have already mentioned her illustrious rulers and statesmen. Swedish military science at this time made epoch by the genius of such generals as *Gustavus Adolphus*, *Gustavus Horn*, *Banér*, *Torstensson*, and King *Charles X Gustavus*; amongst the fieldmarshals of Charles XII may be mentioned *Lewenhaupt*, and Sweden's last national hero, *Magnus Stenbock*, who preserved his country from losing Skåne. But Sweden began at that time to show great names in the peaceful field of culture too; we may mention *Stiernhielm*, the father of Swedish poetry, *Stiernhöök*, the great historian of law, *Rudbeck*, the famous polyhistor, and the two mechanical geniuses: *Dahlberg*, the leader of the famous march across the frozen Belts, and one of the three great European fortress-builders of the period, and *Polhem*, the precursor of the great band of Swedish inventors of later days. It is also significant of the enlightened Swedish government of the times that a number of the most illustrious men of the century in foreign lands were offered Swedish hospitality and Swedish protection, and even positions in the Swedish service. The names of Hugo Grotius, Pufendorf, Descartes, and

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Comenius may here be sufficient. The greatest honour of this move belongs, perhaps, to Axel Oxenstierna, who was probably the most enlightened and many-sided statesman of his day. But in this respect Queen *Christina* too, is worthy of a gratitude, which her administration in other matters certainly does not deserve.

Bearing Home of the corpse of Charles XII.
From a picture by G. O. CEDERSTRÖM.

The Period of the Predominance of the Riksdag (1718/72). The death of Charles XII gave the signal for a thorough change in the form of the Swedish government. The terror caused by the misuse of royal autocracy during the period of the great war was so general and so deep-rooted that Sweden abruptly rushed into the opposite extreme, becoming subject to a Riksdag, which possessed itself, not only of all legislative power, but also of a great part of the executive one.

In the section of this work which treats of the history of the Swedish Constitution, a more precise account is given of the form of government during this period. Here, we may but mention that the Riksdag still consisted, as it had done for many hundred years previously, of four Estates: the Nobility, the Clergy, the Burghers, and the Peasantry. Amongst these, the Nobility, especially the numerous class of the Lower Nobility, now acquired the greatest influence. By degrees, the greater part of the power of the Riksdag came into the hands of a delegation of the members, called the Secret Committee, where only the three first Estates were represented.

During the period in question the royal power was a perfect shadow, and the monarchs themselves (Frederick I and Adolphus Frederick) inspired, personally,

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little respect. As a matter of fact, Sweden was, during this half century, a *republic* ruled by an oligarchy — a peculiar phenomenon at a time when nearly all the powers of continental Europe were, without exception, governed by the strictest monarchical absolutism.

There is no doubt but that the government of Sweden, during this so-called Period of Freedom, suffered from essential defects, of which the most fatal was the general corruption which prevailed towards the close of the period, recalling the state of things which had existed a little earlier in England under the government of Walpole, but which was all the more dangerous in Sweden as it was brought about to a great degree by foreign Powers for the promotion of their own interests. But, on the other hand, our country had here the opportunity of learning its earliest lessons in the school of modern parliamentarism, and earlier than any other European people, with the exception of the English. And, if the Swedish form of government in our days has attained to a high degree of constitutional maturity, it is due, in no small degree, to the experience — both of good and evil — gained during this period, which is not seldom judged by historians with unjust severity.

Thus, if Sweden, during this time, made important progress even in its *political* development, the greatest merit of the period is the revival it brought in *economical* and *scientific* spheres. Excluded from its former influence on the military and the diplomatic fate of Europe, our nation flung itself with youthful enthusiasm into the midst of peaceful pursuits. The name that is here the most illustrious is that of *Linnæus*, surrounded by those of his numerous pupils, *Thunberg*, *Kalm*, *Forskål*, and many others; but Sweden at that period also produced chemists, such as *Scheele* and *Bergman;* physicists, such as *Celsius;* and the universal genius, *Svedenborg*. At this time also lived the astronomer *Wargentin*, the founder of the celebrated Swedish statistics of population. Contemporaneously, *Alströmer* was making his name famous in our history as the creator of Swedish industrialism. The period was also rendered illustrious in the domain of letters, modern Swedish as a literary language being inaugurated at this time by *Dalin*, and modern Swedish poetry by *Creutz* and *Bellman*.

The mode of Government of the period appears to most advantage at the beginning, as long as it was directed by the great statesman, *Arvid Horn*. The dark side of the picture showed itself more and more towards the end, especially the corruption spoken of, which, to all appearances, even placed the very safety of the country in danger. With surprising ease, and without the slightest shedding of blood, *Gustavus III* (1771/92), the very year after his accession, by a coup d'état, abolished the form of government previously existing, substituting for it, the Constitution of 1772. This introduces the so-called

Gustavian Period (1772/1809) of our history. The royal power now became considerably augmented, yet without becoming autocratic. The land was tired of party strife, and attached itself with confidence to the King, who had imbibed the teachings of the age respecting enlightened despotism, and governed well for some time in accordance with the spirit of these teachings. Gustavus III had an artist's nature, with its merits and its faults; he had a sincere love of his country and endeavoured to make it great once more, but he had neither sufficient tenacity nor ability for properly directing financial matters. He surrounded himself with an illustrious circle of poets and artists, an inheritance, for the most part, from the literary florescence of the preceding period; we may name *Kellgren*, *Thorild*, *Leopold*, *Lenngren;* amongst the artists of the period, *Sergel*, the predecessor of Thorvaldsen, was prominent. Our land made, at this time, a contribution to the domain of philanthropy, which must not be forgotten.

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Influenced by Svedenborg, *Wadström*, a Swede, was the first in Europe to lift up his voice on behalf of the abolition of negro-slavery, being thus a precursor of Wilberforce, and, as such, much esteemed both in England and in France, in which latter country he received the distinction of being elected a citizen.

But the King soon tired of his work of reform, and involved himself and his land in economical difficulties. He knew of no other means to save himself from the growing opposition than a war with Russia; a war that was, however, carried on with honour, making the position of Sweden in regard to that powerful neighbour, for the time being, secure. He could vanquish the opposition of the irritated nobility only by means of a new coup d'état in 1789, which came near re-establishing autocracy. Three years later he fell victim to an assassin, goaded by the intense fury which his unconstitutional policy had awakened, especially amongst the nobility.

Drottningholm Palace. At Lake Mälaren.

The royal autocracy was, however, inherited by his son, *Gustavus IV Adolphus* (1792/1809), one of the most disastrous sovereigns who ever had the guidance of the fates of Sweden. He was undoubtedly fully imbued with the most honourable intentions, but his limited mental powers rendered him at last impossible as a king. His fanatical detestation of the universal conqueror, Napoleon, whom he believed himself called upon to overthrow, caused the latter to awaken the enmity of Russia towards Sweden, and the war of 1808/09 brought about the *loss of Finland*, a country which had so long faithfully shared the vicissitudes of Sweden, and, thanks to their union, also had its part in the culture of western Europe. In order to save the kingdom from ruin, the deposition of the king,

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by means of a *military revolution*, became necessary (1809). A Riksdag was called together to draw up a new Constitution, and the result of its deliberations is the Constitution now in force.

Recent Times (1809 to the present day). The history of Sweden during the present century will be so often treated of, from different points of view, in the following sections of this book, that we can here confine ourselves to some few chief data.

Out of the Revolution evolved the Constitution of 1809, still existing, and which has secured to Sweden ninety years of internal and external peace, with a great material and intellectual development, under the protection of a constitutional form of government. The Kings of Sweden during the time have been *Charles XIII* (1809/18), *Charles XIV John* (1818/44) — the first of the line of Bernadottes to ascend the throne — *Oscar I* (1844/59), *Charles XV* (1859/72), and ***Oscar II*** (since 1872).

The University Palace of Uppsala.

The first years after 1809 brought with them important incidents in the sphere of *foreign* politics, viz. the participation of Sweden in the war of freedom against Napoleon (1813), and the union with Norway (1814), of which latter event an account is given elsewhere. On the conclusion of peace with Denmark, Sweden gave to that country, in compensation for Norway, its last possession on the other side of the Baltic — Pomerania. Since that time the two nations inhabiting the Scandinavian peninsula have pursued a strictly defensive and peaceful policy, sheltered by the seas encompassing them from sudden invasion, and not unnecessarily interfering in the affairs of Europe.

For some decades the *Scandinavian Movement* appeared in great strength, expressing itself in an endeavour to unite more closely the three Scandinavian

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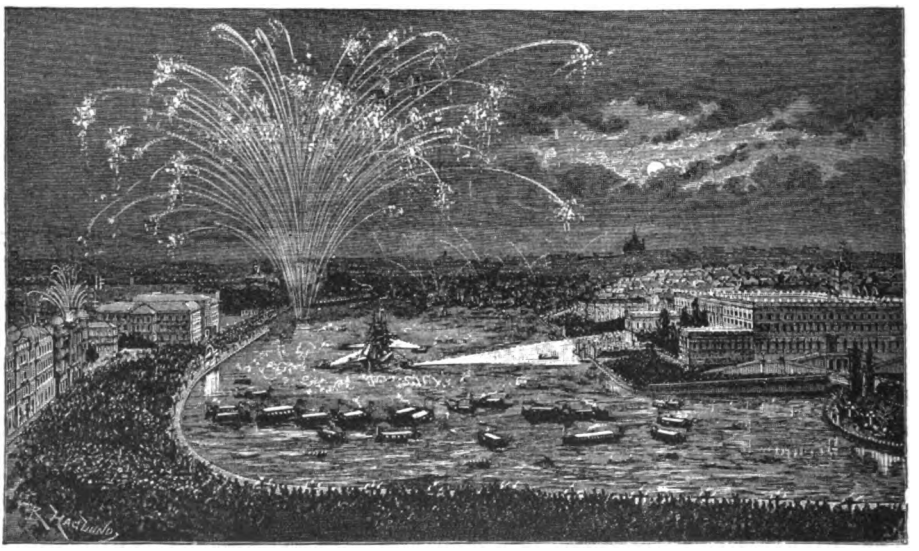
peoples, Swedes, Norwegians, and Danes, at first in a political sense, but afterwards in cultural and economical respects. The results gained are chiefly in the judicial sphere, where, in many important respects, the three nations have approached each other, in some cases to the extent of almost identical legislation. The influence of the Scandinavian Movement upon literature, science, and art, has also been of great importance.

As regards the *internal politics* of Sweden during this period, we may notice the important change in the composition of the Riksdag, in 1865, by the abolition of the four Estates, and their replacement by two chambers, in accordance with modern parliamentary forms — yet one more of those revolutions *carried out under legal forms*, in which the history of Sweden abounds.

In other respects, the most important events of the period are to be found in *economical*, *social*, and *scientific* domains. The important developments brought about during the century in these respects, are the subjects treated of in the greater part of this present work. We need but mention the great improvement in and spread of prosperity, the rise of many new branches of industry, the astonishing perfection to which the means of communication have been brought, the great work of popular education, and the great growth of purely cultural interests, in which sphere our scientists and explorers have obtained world-wide renown. Sweden has, moreover, like the two other northern nations, during the present century, entered into far more intimate connection with foreign countries than was possible with the imperfect means of communication of olden times. New ideas and movements reach our shores as quickly as those af any other nation, and it not seldom happens, indeed, that it is from the North that the new ideas emanate. Whilst fully recognizing that in Sweden, as elsewhere, there are shades, calling for serious reform and regenerative work, the Swedish people of the present day venture to hope that the future — and, perhaps, the near future — will bring their Country such flourishing economical and intellectual conditions that the whole of their preceding history may be considered as but a time of preparation and of education, in comparison with the years to come.



Return to Stockholm of the Vega Expedition. April 24, 1880.

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2. DEMOGRAPHY OF SWEDEN.

The nation which inhabits and which, from what has been shown in the preceding pages, has for at least six thousand years uninterruptedly possessed the land of Sweden belongs to the *Germanic* branch of the *Arian* family of nations, and to the particular division of that branch, which is called the *Scandinavian* nations. The last-named peoples, who are so nearly related to each other that they mutually understand each other's language, embrace, on the whole, a number of about 13 million souls; of these, somewhat more than 2 1/2 millions are settled in the United States of North America, 1/3 million live in Finland, which formerly belonged to Sweden, and 1/6 million, in North Schleswig, once belonging to Denmark. The remainder, somewhat 10 millions of people, inhabit the three Scandinavian kingdoms of northern Europe: Sweden, Norway, and Denmark, of which countries, Sweden possesses somewhat more than 5 million inhab. and Norway and Denmark, each between 2 à 2 1/2 millions. Besides these, somewhere about one hundred thousand Scandinavians live on the distant islands of Färöe and Iceland, belonging to Denmark.

The total number of the **Swedish people** must, at present, amount to about *7 millions* of souls, if we include 1 1/3 million Swedes in America, of which latter number a great part will doubtlessly soon have exchanged the Swedish language for English. Of the Swedes in Europe, about 370,000 live in Finland and perhaps about 100,000 in all other European countries (of this number, there are at least 40,000 in Norway, and in Denmark probably nearly as many); the remainder, somewhat more than 5 million people, inhabit the kingdom of Sweden.

As, besides the people of the Swedish race, Sweden possesses but about 20,000 Finnish inhabitants, 7,000 Lapps, and perhaps about 20,000 foreigners of different nations, our land can with reason be said to boast of a rare degree of *ethnographical homogeneity*.

The Swedish language has developed itself into a specific one out of the tongue that about a thousand years ago was spoken in common throughout Scandinavia. The first era in the history of our language is generally termed the *Runic period* (till about 1200); Swedish of that time is known merely through the runic inscriptions, which, as a rule, are rather stereotyped. The era of early or *Classic Old Swedish* extends over the period of 1200/1350; during that time, the language is, on the whole, free from foreign influence, and the written language shows an unconstraint testifying to its having only inconsiderably diverged from the spoken one. During the era of *Later Old Swedish* (1350/1500) the written language developed itself more independently of the spoken one, on the basis of the dialect of Östergötland (notice the Folkunga dynasty and Vadstena cloister) but, at the same time, under strong ascendency of middle Low German (through the German burghers in the towns). Towards the end of this period, Central Sweden regained its political weight, which is obvious also in the

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development of the written language; of special importance in that respect was the foundation of Uppsala university. — With the sixteenth century appears *Early Modern Swedish* (1500/1730), which to a great extent is developed by the translation of the Bible; by this means an influence from High German stepped into the place of that from Low German. The King's Swedish got set features and was more and more firmly established, though both during the sixteenth and seventeenth centuries dialectic peculiarities often are perceptible. An increased cultural intercourse with Europe in general entailed a considerable influence, first of German, then of French; towards the end of the period an ascendency of the now beginning scientific study of the Old Scandinavian language is to be perceived. With the Code of Laws of 1734 and the appearance of O. von Dalin, the transition is considered to be made to the present written language: *Later Modern Swedish*, which since then has not undergone any remarkable changes. During the nineteenth century Tegnér and Wallin may be said to have exerted the most powerful sway on the phraseology of the language; the late decenniums have shown an unmistakeable tendency toward decreasing the gulf between spoken and written language by allowing the latter some more liberty.

The most typical characteristics of the Swedish language compared with its nearest relations, are the contraction of the old diphthongs, a profusion of unaccented vowel terminations, and a very peculiar accentuation, which to a certain extent is to be found also in Norwegian but hardly in any other European language. As a general estimation of the language may be maintained that Swedish bears a stamp of force and clearness, of sonorousness and variety.

Modern **dialectical** research divides Sweden into four regions: *a*) Northern Sweden, comprising Norrland and Dalarne; *b*) Middle Sweden, comprising the remaining parts of Svealand and northern Götaland; *c*) Southern Sweden, consisting of the greater part of Småland with the addition of Skåne, Halland, and Blekinge; and *d*) the island of Gotland. — For a long time it was taken for granted that the people of Sweden descended from two different tribes: Swedes and Goths, whose names still subsist in the denominations of Svealand and Götaland. This theory about a real difference of tribes must, however, nowadays be looked upon as abandoned.

A triple division appears very distinctly in the **vital statistics,** viz. *a*) the *Eastern* part of South Sweden, distinguished by numerous and early marriages but none the less by little matrimonial fecundity and a great number of illegitimate births, a high death-rate in general, a great frequency of suicides, and finally by a low surplus of births, but with a slight amount of emigration; *b*) the *Western* part of South Sweden, characterized by the paucity and lateness of marriages, but not the less by great matrimonial fecundity and a low number of illegitimate births, moderate or small death-rate, a low frequency, in general, of suicides, but with great emigration; and finally, *c*) *North Sweden*, distinguished by moderate frequency of marriages, in general, by very great matrimonial fecundity and a low number of illegitimate births, for the most part by a low death-rate and a very great surplus of births, and by a slight amount of emigration.

During the last few decades, these distinctions have, however, become weakened in part, and the characteristics given above must, at the present moment, confess to several exceptions. The boundaries of the three districts, which can be given but approximately, are found marked on the map illustrating fecundity of marriages (p. 121), which factor seems, in reality, to be the most distinguishing feature of this division. (That the län of Jemtland, at the present day, is distinguished from its group by a somewhat greater matrimonial fecundity, is a phenomenon of late appearance, which can be explained by the great immigration into the district, and the high frequency of marriage.)

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Of the **foreign races,** which are to a small number represented in Sweden, the Finns and the Lapps are concentrated in the northernmost part of the country, or peculiarly in the province of Lappland, belonging to the läns of Norrbotten and Vesterbotten.

As regards the **Lapps,** these have dwelt in Lappland from the most ancient times, and, in smaller numbers, in the län of Jemtland too. It is absolutely wrong to mark, as the German ethnographical charts nearly always do, the whole of the inner part of North Sweden as far down as to 62° n. lat., as inhabited by Lapps. Of the 110,000 inhabitants of the län of Jemtland, the Lapps number but 800, and even in Lappland this people is in such a decided minority that only a single parish is found there in which the Lapp race forms more than one-half of the population: this parish is the most northerly one in the whole of our country (Enontekis). In Lappland as a whole, the Lapps do not amount to even one-tenth of the population. — See for the rest the special article on the Lapps at p. 166.

The 20,000 **Finns** are found to the greatest part in the län of Norrbotten, where, especially in the valley of Torneå, they form compact bodies. At present, a knowledge of the Swedish tongue is spreading to no small degree amongst these Finns; the greater number of them, however, as yet understand only their mother-tongue. To the mining-districts of Central Sweden there was, in the sixteenth and seventeenth centuries, a not unimportant immigration of Finns, who have, however, at present quite coalesced with the Swedish population. The same state of things holds good for the colony of *Walloons* called in, during the seventeenth century, to the iron-works of Dannemora in Uppland.

Population of different »läns».

From an historical point of view, Sweden is divided into 25 provinces, the names and boundaries of which are indicated on the chart, p. 4. But from an administrative point of view Sweden is divided into 25 administrative districts, called **län,** cf. chart, p. 94. The areas of the läns and their population at the end of 1751, 1865, 1900 are given in Table 5, p. 95.

In the main, a Swedish län covers nearly 18,000 sq. km. (the five most northern läns, in the main, above 52,000; the remainder about 9,000 sq. km.). The largest län, Norrbotten, covers not less than 106,000 sq. km., i. e. nearly $^1/_4$ of the entire country, and considerably more space than each of the countries of Scotland, Ireland, or Portugal. The four northernmost läns, Norrbotten, Vesterbotten, Vesternorrland, and Jemtland, cover 241,379 sq. km., or more than $^1/_2$ of Sweden, the area of remaining läns amounting collectively only to 206,483 sq. km.

The most populous län of Sweden is Malmöhus, which contains above 410,000 inhab. Next comes the län of Göteborg och Bohus with nearly 340,000, and the city of Stockholm with more than 300,000 inhab. Gotland is the only län with less than a hundred thousand inhab. (viz. 53,000). Svealand has 1,580,000, Götaland 2,696,000, and Norrland 860,000 inhab. In Lappland, alone, the population amounts to 60,000.

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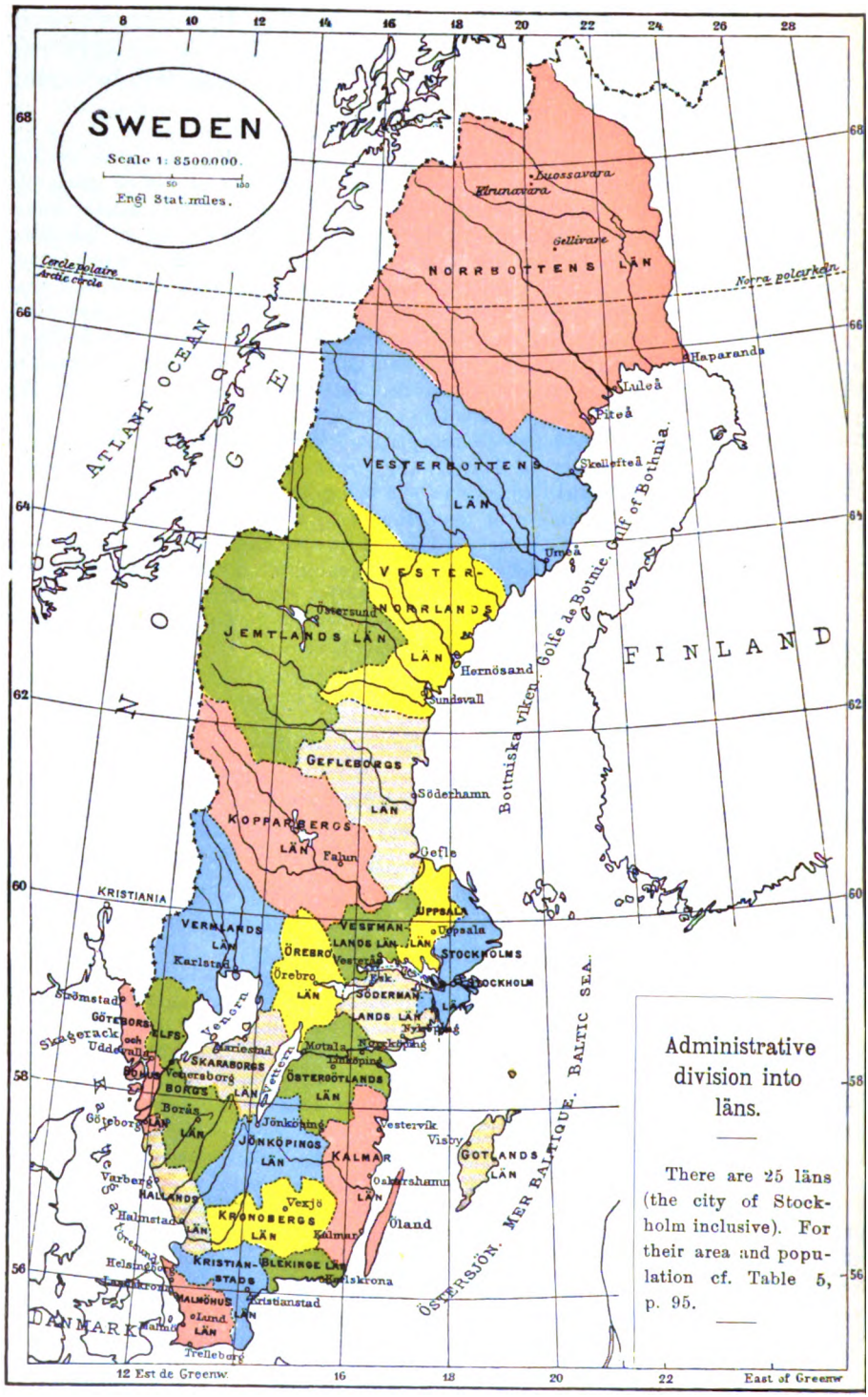

Administrative division into läns.

There are 25 läns (the city of Stockholm inclusive). For their area and population cf. Table 5, p. 95.

Gen. Stab. Lit. Anst. Stockholm.

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TABLE 5. *Area and population of the läns.*

Län.	Area. Sq.km.[1]	Population at the end of the years			In % of the entire population.			Inh. per sq.km 1900[4].
		1751.	1865.[2]	1900.	1751.	1865.	1900.	
Stockholm, city	33	61,040	133,361	300,624	3·39	3·24	5·84	.
Stockholm, prov.	7,812	91,399	128,458	172,852	5·07	3·12	3·37	22
Uppsala	5,313	63,895	96,766	123,863	3·54	2·35	2·41	23
Södermanland	6,816	79,817	133,900	167,428	4·43	3·25	3·26	25
Östergötland	11,047	128,911	253,148	279,449	7·15	6·15	5·44	25
Jönköping	11,521	106,317	183,851	203,036	5·90	4·47	3·95	18
Kronoberg	9,910	67,283	162,553	159,124	3·73	3·95	3·10	16
Kalmar	11,543	96,053	233,165	227,625	5·33	5·67	4·43	20
Gotland	3,158	24,562	53,165	52,781	1·36	1·29	1·03	17
Blekinge	3,015	47,000	125,436	146,302	2·61	3·05	2·84	49
Kristianstad	6,445	90,335	222,235	219,166	5·01	5·40	4·27	34
Malmöhus	4,829	105,163	305,261	409,304	5·83	7·42	7·97	85
Halland	4,921	58,234	126,060	141,688	3·23	3·06	2·76	29
Göteborg och Bohus	5,047	76,537	232,181	337,175	4·25	5·64	6·57	67
Elfsborg	12,725	115,853	279,153	279,514	6·43	6·79	5·44	22
Skaraborg	8,480	97,918	236,775	241,069	5·43	5·76	4·69	28
Vermland	19,323	100,917	259,612	254,284	5·60	6·31	4·95	13
Örebro	9,095	73,000	162,717	194,924	4·05	3·96	3·80	21
Vestmanland	6,768	71,952	108,859	148,271	3·99	2·65	2·89	22
Kopparberg	29,849	97,428	174,758	217,708	5·41	4·25	4·24	7
Gefleborg	19,724	56,000	143,793	238,048	3·11	3·50	4·64	12
Vesternorrland	25,532	36,890	127,524	232,311	2·05	3·10	4·52	9
Jemtland	50,972	19,000	68,071	111,391	1·05	1·65	2·17	2
Vesterbotten	58,993	18,369	88,763	143,735	1·02	2·16	2·80	2
Norrbotten	105,882	18,500	74,576	134,769	1·03	1·81	2·62	1
The large lakes[3]	9,109	—	—	—	—	—	—	—
Total	447,862	1,802,373	4,114,141	5,136,441	100	100	100	11

Population at different periods.

The population of Sweden at some characteristic times during the course of the last few centuries, is seen by Table 6, and in Table 7 the rates of births and deaths are also given from the year 1700; a series of details quite unequaled in their kind.

To follow the changes of the population of Sweden is to follow in the main the history of its people. On this pregnant subject only a few hints can here be given.

It was formerly believed that during the early Middle Ages (before the Black Death at the middle of the 14th century) Sweden possessed a population of many millions, but this view is now abandoned. According to the figures given in the Table, Sweden had in 1570 a population of about 900,000. The 17th century, so rich for Sweden in glory and suffering, seems, in spite of the almost constant succession of wars, to have brought with it no inconsiderable increase of population, so that, at the close of that century, Sweden probably possessed, within its present boundaries, about 1½ million souls.

[1] A sq. kilom. = 0·386 sq. mile. — [2] At the beginning of the greater emigration. — [3] Venern, Vettern, Mälaren, and Hjelmaren. — [4] One inhab. per sq. km. = 2·59 inh. per sq. mile.

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TABLE 6. *Population of Sweden at different times.*[1]

At the end of the years	Population.	Annual increase.		At the end of the years	Population.	Annual increase.	
		Total.	‰.			Total.	‰.
1570	900,000	.	.	1755	1,878,000	15,086	9·48
1650	1,225,000	4,063	3·86	1815	2,465,066	9,784	4·54
1700	1,485,000	5,200	3·86	1865	4,114,141	32,982	10·30
1720	1,350,000	— 6,750	— 4·75	1900	5,136,441	29,209	6·36

During the first two decades of the 18th century, inexpressible suffering was caused to the nation by the "Great Northern War". One cannot therefore be surprised to find the population of Sweden in 1720 considerably less than it was in 1700. After the re-establishment of peace followed a generation (1721/55) of quiet, happy times, when our people gathered new force and made considerable progress, both economical and intellectual (Linné and his pupils, etc.). During this period, the population of Sweden increased by nearly 10 ‰ annually, a rate of increase which, at that time, could hardly have been equaled in many countries of Europe. At the close of 1768, Sweden completed its 2:d million of population.

Less gratifying is the history of our people during the sixty years 1757/1813, which were distinguished by new losses and sufferings of many different kinds, resulting in a diminished rate of increase in the population. Finally, in 1809, Finland, the long-loved daughter of Sweden, was lost; five years later the union with Norway took place, and we reach the beginning of the recent period.

The 90 years of unbroken peace, with which our nation has since been blessed, commenced with a period of fifty years, 1814/66, during which the population increased at a rate unequalled both before and after that time. It was the last epoch of the old, and more patriarchal

TABLE 7. *Movement of population in Sweden, 1701/1900.*[2]

Years.	Mean population.	Yearly per 1 million of the mean population..					
		Marriages.	Live births.	Deaths [3].	Surplus.	Emigration[5].	Increase.
1701/50	1,537,000	.	34,250	30,400	3,850	.	3,850
1751/75	1,925,473	8,684	34,440	28,920	5,520	290	5,230
1776/00	2,183,696	8,369	33,120	26,587	6,533	290	6,243
1801/25	2,482,582	8,595	32,944	26,477	6,467	210	6,257
1826/50	3,094,886	7,310	31,629	22,268	9,361	90	9,271
1851/75	3,943,423	7,041	31,753	20,317	11,436	2,256	9,180
1876/00 [4]	4,742,048	6,191	28,506	16,948	11,558	5,205	6,353

[1] Within the present limits of the Kingdom. The figures for the years 1570 and 1650 only are evaluations. — [2] For 1701/50 mainly by approximate calculations. — [3] For 1751/1815 with approximate additions for those fallen in war, usually not counted in official reports. — [4] Provisional numbers for 1900. — [5] Net emigration. Before 1850 by rough estimate; for 1851/84 with approximate corrections of the official figures.

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industrial system, which had hitherto flourished in Sweden. During the decades which have passed since then, the country has been drawn within the sphere of modern industrial concentration and international competition, and this under conditions which have been unusually unfavourable to us. It cannot surprise us then that this period of transition brought with it economical difficulties, expressing themselves in various ways, amongst them in an excessive emigration, which naturally diminished the increase of population. At present, however, everything tends to indicate that this unfavourable period of transition is now drawing to a close, and that a new and prosperous era in the economical history of Sweden is about to open. Since 1894, emigration has again sunk to a relatively low point. The population, which in 1835 amounted to 3 millions, and in 1863 to fully 4 millions, at the close of 1897 exceeded 5 millions, and still shows satisfactory signs of growth.

To be able properly to appreciate the rate of increase of the population of Sweden, this rate should be compared with that of the entire European continent during the same period. Such a comparison is possible, however, for the nineteenth century only, and is shown in following table.

TABLE 8. *Increase of population in Europe and in Sweden.*

At the end of the years	Population.		Sweden in ‰.	Years.	Annual increase, ‰.	
	Europe.	Sweden.			Europe.	Sweden.
1800	186,855,000	2,347,303	12·56	Average:		
1820	213,246,000	2,584,690	12·12	1801/20	6·64	4·84
1840	250,342,000	3,138,887	12·54	1821/40	8·05	9·75
1860	283,188,000	3,859,728	13·63	1841/60	6·19	10·89
1880	332,560,000	4,565,668	13·73	1861/80	8·08	8·43
1900	399,800,000	5,136,441	12·85	1881/00	9·25	5·91

Thus, at the beginning of this century, the population of Sweden amounted to 12·56 ‰ of that of all Europe, while, at the end of the century, the proportion was 12·85 ‰. Consequently, in spite of an immense emigration, the population of our country has in no ways fallen behind the general advance. The rate of increase has been, on an average, 7·64 ‰ yearly for the whole of Europe, and for Sweden 7·86 ‰.

A general idea of the increase of population in the different *läns* can be gained by reference to Table 5. It should be pointed out, that in former times the increase of population in the different parts of the country varied far less than is the case now. The towns were still unimportant, the communications imperfect, the limits between different trades difficult to pass, while emigration was almost unknown. The consequence of this was, on the whole, that the population of each district increased by means of its excess of births over deaths. The highly pronounced unequalness in our days in the increase of the population is due to

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the varying amounts of emigration, and the immense increase of the migration within the country. In some of the purely agricultural districts of Southern Sweden, the population is even on the decline. All the greater is the growth of population in the northern parts of the country — "the America of Sweden". The five läns given last in Table 5, and which are usually comprised under the common name of Norrland (see map, page 4), possessed in 1751 only 8·26 % of the population of Sweden; in 1865 the proportion had risen to 12·22 %, while in 1900 it had reached 16·75 %. — In fact, the *annual increase* of the population of the different parts of Sweden has been, in ‰:

Average.	Svealand.	Götaland.	Norrland.	Sweden.
Years 1752/1815	3·33 ‰	5·24 ‰	8·59 ‰	4·90 ‰
» 1816/1865	8·34 »	10·71 »	13·50 »	10·30 »
» 1866/1880	7·63 »	4·83 »	15·03 »	6·96 »
» 1881/1890	7·40 »	0·06 »	16·94 »	4·70 »
» 1891/1900	8·90 »	3·82 »	14·66 »	7·11 »

During the whole period of 1866/1900, i. e. after the beginning of emigration, the annual increase has been: in Svealand 7·92 ‰, in Götaland 3·18, and in Norrland 15·47 ‰; all Sweden 6·36 ‰. — Respecting the various **läns,** we find that the annual increase of population has been during the decade between 1890 and 1900, in ‰ of the mean population:

Län.	‰.	Län.	‰.	Län.	‰.
Norrbotten	25·66	Kopparberg	9·80	Uppsala	2·26
Stockholm, city	19·79	Södermanland	7·71	Elfsborg	1·36
Vesterbotten	15·69	Vestmanland	7·59	Vermland	0·38
Gefleborg	14·14	Örebro	6·56	Kronoberg	— 1·08
Stockholm, prov.	12·66	Jönköping	4·74	Kristianstad	— 1·15
Göteborg och Bohus	12·51	Östergötland	4·73	Kalmar	— 2·28
Vesternorrland	10·76	Halland	4·01	Skaraborg	— 2·46
Malmöhus	10·51	Gotland	2·79		
Jemtland	10·42	Blekinge	2·58		

The correspondent figures for the decade 1881/90 are to be seen by Table 15, on page 114, which indicates also the excess of births and the migration. This table shows that, during the same decade, the *internal migration* has given a *surplus* for the city of Stockholm and for the läns of Uppsala, Malmöhus, Halland, Göteborg och Bohus, Gefleborg, Vesternorrland, Jemtland, and Norrbotten.

Excess of Births. Even if the actual increase of population in Sweden declined during some decades in consequence of emigration, the excess of births over deaths has greatly increased from what it was formerly. At present, however, it can be regarded as stationary. The absolute and relative figures for the last two centuries are as follows. (Cf. also Table 7).

Yearly.	Mean population.	Live births.	Deaths.[1]	Surplus.	Id. per 1,000 inh.	Births to a hundred deaths.
1701/50	1,537,000	52,620	46,720	5,900	3·85	113
1751/00	2,054,585	69,319	56,871	12,448	6·06	122
1801/25	2,482,582	81,787	65,732	16,055	6·47	124
1826/50	3,094,886	98,057	68,918	29,139	9·36	142
1851/75	3,943,423	125,217	80,117	45,100	11·44	156
1876/00[2]	4,742,048	135,177	80,369	54,807	11·56	168

[1] With approximate additions for deaths in war (600 per annum during the period 1751/1800, and 1,600 per annum during the period 1801/25). — [2] Approximate numbers for 1900.

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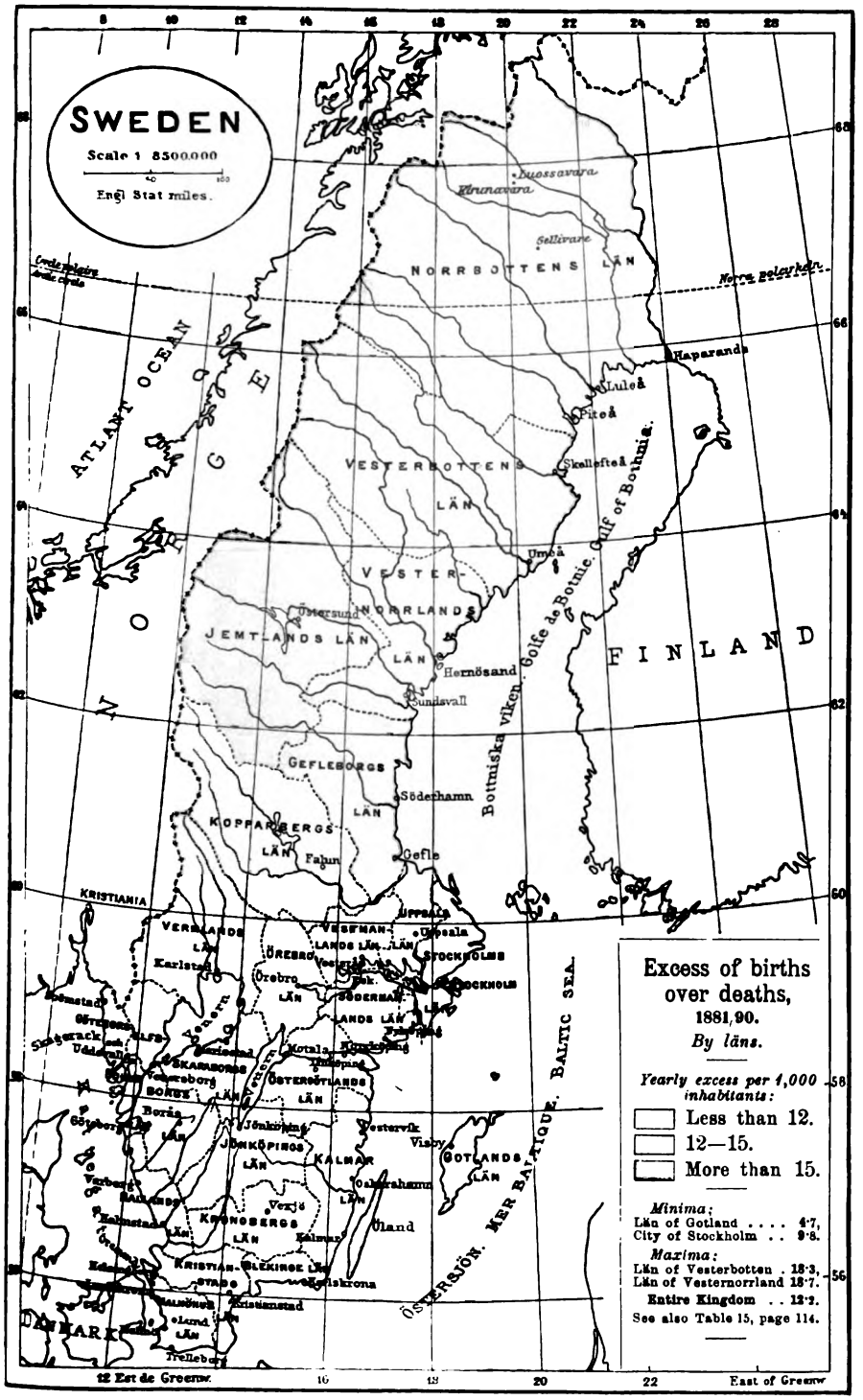

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At present, then, the annual excess of births over deaths amounts in Sweden to *11 or 12 ‰ of the whole population*. The average for the whole of Europe is a little over 10 ‰, the position of Sweden thus being favourable. It becomes still more so if the number of births is given *proportionately* to the number of deaths. For every hundred of deaths there are in Sweden about 168 births (living children) — a condition of things which is exceeded by scarcely any country in Europe, excepting Norway, where the births are represented by the figures 180. The average for the whole of Europe is: about 140 births to one hundred deaths.

On the whole, the proportion just given — that of the number of births to the number of deaths — is one of the most important points in the vital statistics. A most extraordinary proof of healthy vital power is presented by the population of our län of *Vesterbotten*. During the ninety years 1811/1900, a total of 252,343 children were born there, whilst the number of deaths was but 124,855. Thus, during nearly a whole century, the proportion of births to deaths has been no less than 202 to a hundred. The years 1891/1900 show the proportion 207: 100 — hence, no decrease.

Density of population.

Though possessing an area of 45 millions of hectares, Sweden has but 5 million inhabitants. There are thus only 11 persons to every sq. km.[1] This is a very low figure when compared with the average for Europe (40 inh. per sq. km.), and still more so when compared with that for Western Europe alone, which is 60 inh. per sq. km. Of all the countries of Europe, only Norway and Finland are less densely populated than Sweden.

The conditions are quite changed if we have regard to the northerly situation of our country. It must be remembered that Sweden lies as far north as Alaska. As a matter of fact, there exists nowhere in such high latitudes so relatively dense a population as is found in the Scandinavian peninsula.

It is clear that Sweden, with a length, from north to south, of 1,600 km., or almost one-sixth of the distance from the pole to the equator, must, in respect to its various divisions, present most striking differences from the average figures for the whole country. Table 5 gives the relative figures in respect to density of population in the different *läns:* the map on page 101 shows the differences of the figures in every *community*. This map, however, refers to the **rural districts** alone.

The map mentioned above gives five different gradations of density of population, viz.: less than 1 inhab. per sq. km.; more than 1, but less than 5 inh. per sq. km.; between 5 and 20 inh. per sq. km.; between 20 and 50 inh. per sq. km.; and, finally, over 50 inh. per sq. km.[2]

[1] A sq. kilom. = 0·386 sq. mile, and 1 inhab. per sq. kilom. = 2·59 inhab. per sq. mile. — [2] The five gradations correspond thus: below 2·6 inhab. per sq. mile; 2·6—13 inhab.; 13—52; 52—130; and more than 130 inhab. per sq. mile.

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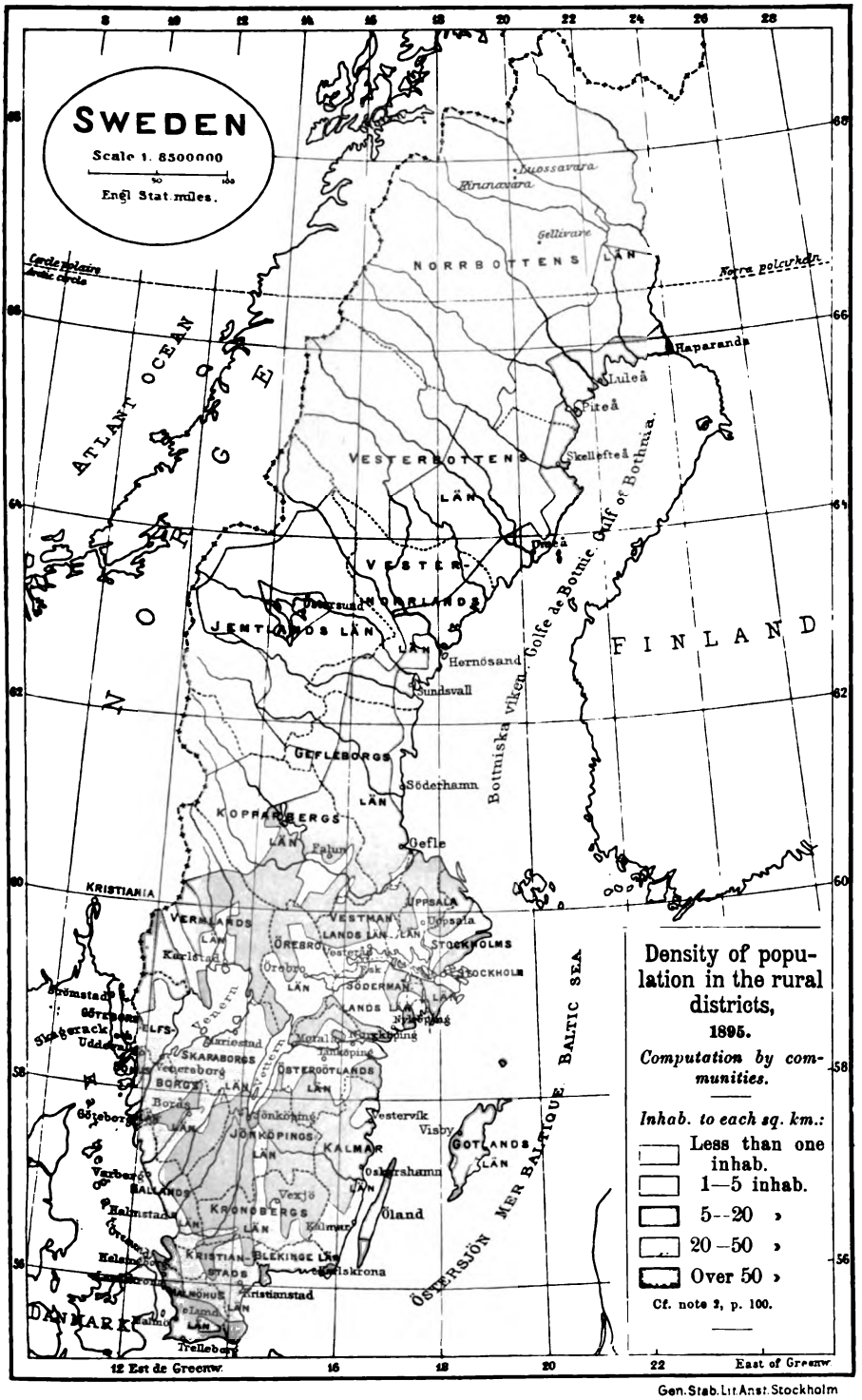

Gen. Stab. Lit. Anst. Stockholm

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Waiving some smaller variations, Sweden is thus divided into *five extensive regions*, the first, second, and fourth of the above-mentioned gradations forming each a connected district, while the third gradation (5—20 inh. per sq. km.) embraces two belts of land lying at a certain distance from each other: one in Northern Sweden, the other in the southern part of the country. As for the highest of the gradations of density of population here mentioned (over 50 inh. per sq. km.), it is found to any greater extent only in southern Skåne: in other parts of the country there are but a few, scattered districts that fall within this category.

The first of the chief districts we have mentioned embraces north-western Sweden, i. e. the whole of Lappland (cf. map, page 4) and the tracts running along the Norwegian frontier as far south as upper Dalarne, south of lat. 62° N. In this great territory, embracing 127,000 sq. km., or no less than 30 % of the whole country, live but little more than 50,000 people, or **less than 1 to every sq. km.** Such desolation is unknown in the rest of Europe, if we exclude Russia and the north of Norway and Finland. But it is within this district of almost arctic desolation that we once more find the immense ore-fields met with in Northern Sweden, and where a population has commenced to gather, which, in a not distant future, may grow to relatively great dimensions.

Farthest north, the whole width of Sweden, the coast-line excepted, is as poorly populated as we have said, but when we come as far south as Jemtland, the remark holds good only for the western or mountain district proper. The central part of the country here forms a district possessing a population of **more than 1 but less than 5 persons per sq. km.** (On the map marked by light blue colour). We find here a population of 235,000 to an area of a little more than 90,000 sq. km., a density which must still be regarded as exceedingly small. It must be remembered that the little population to be found, is almost entirely grouped in large villages by the rivers. Between these villages lie scores of miles of expanse where not a single human habitation is to be seen.

The density of the population is considerably greater along the coast of the Gulf of Bothnia. This is particularly the case in the tract lying between the rivers Ångermanelfven and Ljusnan, where, in the large saw-mill centers, we often find from 50 to 100 persons per sq. km. — a density equal to that in the most populated districts of South Sweden. Apart from this tract, the coast-district belongs to that belt of land possessing from **5 to 20 inhabitants per sq. km.;** a belt which expands at the southernmost part of the Gulf of Bothnia so as to embrace the whole width of Sweden.

The last-named degree of density of population characterizes also a considerable part (more than 30,000 sq. km.) of South Sweden, viz., the so-called highlands of Småland south of Lake Vettern, and also the island of Gotland, whose density of population, having regard to the fertility of the soil, is surprisingly small.

The red portions of the map mark that district where the density of population **exceeds 20 persons per sq. km.,** — towns being always excepted. To this district belong the low-lands of Central Sweden lying around the great lakes, Sweden south of the highlands of Småland, and, finally, the west coast of the country as far as the Norwegian boundary.

We find in the län of Malmöhus and in other tracts of south Skåne a part of Sweden where the density of even the rural districts **exceeds 50 per sq. km.** and where, if we include the population of the towns, the density rises to more than 80 per sq. km., a figure which would be respectable even in Central Europe. Elsewhere in Sweden, it is only in a few, smaller districts that, as we see by the map, the population is of equal density.

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TABLE 9. *Communities of Sweden by density of population, 1895.*

Communities grouped according to density of population.	Area. (Waters excluded). Sq. km.*	Population, 1895.	Inhab. per sq. km.*	In % of the entire	
				Area.	Population.
Less than 1 inhab. per sq. km.*	126,772	53,445	0·4	30·88	1·09
1—5 » » »	93,833	235,438	3	22·82	4·79
5—20 » » »	125,891	1,565,422	12	30·62	31·82
20—50 » » »	57,624	1,618,845	28	14·01	32·91
More than 50 » » »	5,847	466,674	80	1·42	9·48
Rural districts	409,967	3,939,824	10	99·70	80·09
Cities	1,228	979,436	798	0·30	19·91
Total	411,195	4,919,260	12	100	100

A summary of the density of population in Sweden, for the year 1895, is given in Table 9. The figures are founded upon separate calculations for each of the 2,400 country parishes of the kingdom.

Thus, it is seen that one-half of Sweden has less than 5 inh. per sq. km., only about 300,000 persons dwelling in this part of the country. The other half of Sweden possesses, on the contrary, about 4,800,000 inhabitants.

Urban and rural population.

A great difference exists, according to Swedish law, between town and country communities as regards their state and local administration and even as regards the administration of justice. Town privileges are conferred by Government and are, at present, enjoyed by 93 places in the kingdom.

Of these 93 towns there are 27 (with altogether, 35,315 inh.) in 1900, each of which possesses fewer than 2,000 people, and which thus, according to general statistical ideas, ought not to be counted as towns. As may be seen, however, the whole population of these 27 small towns is so unimportant that it cannot greatly affect a view of the total urban population of the country. A comparison may, therefore, without any great difficulty, be made with the urban population of other countries.

Amongst the places which are not, in law, recognized as towns, there are a few which have a total population of more than 2,000 souls. Some of these places are suburbs of the towns of Stockholm, Gothenburg, Norrköping, Sundsvall, Eskilstuna, and Motala; others are what are called »köpingar» (boroughs), which, from a legal point of view, are something between town and country, and, finally, there are some industrial and business-places, of which Malmberget — in Gellivare — and Trollhättan, with 7,000 inhab. each, are about the largest.

The total urban population of Europe is calculated as being about 33 % of the whole number of inhabitants, a figure which rises in Western Europe to 45 % while it sinks to a little more than 15 % in the East of the continent. In Sweden, where agriculture is and always has been

* A sq. kilom. = 0·386 sq. mile. One inhab. per sq. km. = 2·59 inhab. per sq. mile.

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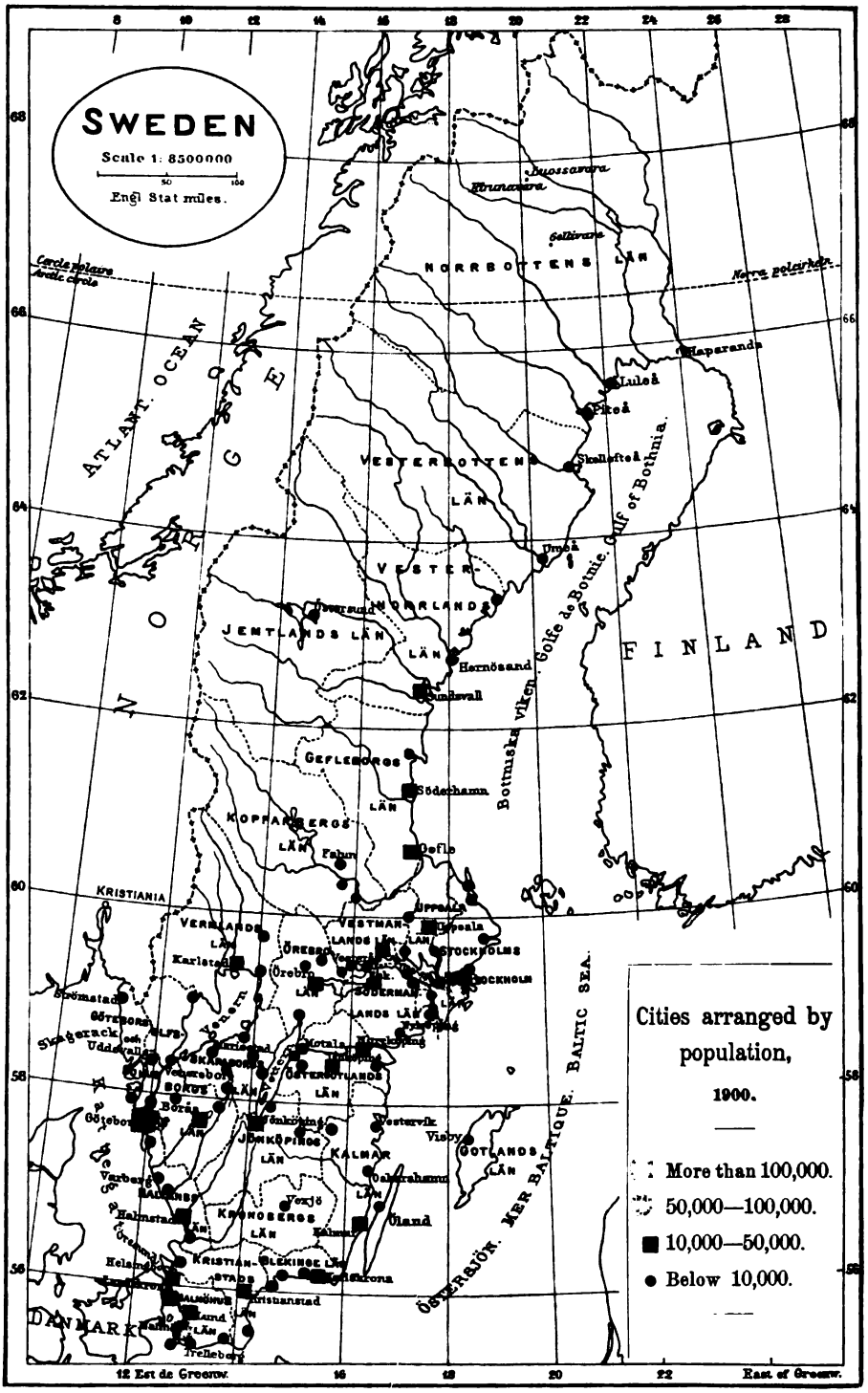

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the chief occupation of the people, the proportion is only 21 % of the whole population, a figure which, while it is greater than that of every East-European country, exceeds only that of Finland in countries belonging to the West of Europe. In 1900, the whole urban population of Sweden amounted to 1,104,000 souls, whilst the country districts boasted a total of 4,032,000 inhabitants.

We have no statistics of the population of our towns of an earlier date than 1805. Table 10 (next p.) shows the development since that date.

Stockholm. Vasa Bridge.

We thus see that the urban population has increased from being scarcely 10 % of the whole population to more than 21 %. An increase of this proportion can first be noticed, however, in the decade beginning 1841, after the abolition of the old guild-statutes (1846); since then, the population of the towns of Sweden has increased at an unusually quick rate — during the last generation by 24 ‰ annually, while in the whole of Western Europe the rate of increase of the towns is, for the same period, but about 15 ‰. By the side of the old, legally recognized towns, new urban centres are nowadays arising near railway-stations, the larger factories, and places of trade and business, etc., which, while they are in most cases, as yet, too unimportant to be counted as towns, still form living nuclei of future centers of population. The next generation will, in this way, doubtlessly see a great increase in the urban population of Sweden.

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TABLE 10. *Urban and rural population.*

At the end of the years	The whole population.	Of this: Rural population.	Of this: Urban population.	Urban pop. in %.	Years.	Total.	Rural population.	Urban population.
1805	2,412,772	2,180,715	232,057	9·62	*Annual increase, ‰.*			
1820	2,584,690	2,330,798	253,892	9·82	1806/20	4·60	4·45	6·01
1840	3,138,887	2,835,204	303,683	9·67	1821/40	9·75	9·84	8·99
1860	3,859,728	3,425,209	434,519	11·26	1841/60	10·39	9·50	18·07
1880	4,565,668	3,875,237	690,431	15·12	1861/80	8·43	6·19	23·42
1900	5,136,441	4,032,490	1,103,951	21·49	1881/00	5·91	1·99	23·74

At the close of the year 1900, Sweden possessed two towns of over 100,000 inhabitants; one of somewhat more than 50,000; seven of between 20,000 and 50,000 souls; and twelve with a population varying between 10,000 and 20.000. The number of the inhabitants in each of these towns at the beginning, middle, and close of the 19th century, may be seen by Table 11.

Stockholm, the capital of Sweden, is the principal manufacturing and import-town of the country. It is located at the point where the waters of Lake Mälaren find their way into the Baltic, that is, at the entrance to the extensive low-lands of Central Sweden. This location of the capital of the kingdom was a most natural one in former days, when the Baltic was the chief scene of Sweden's peaceful or warlike expeditions, and at a time when the greater part of the shores of the same sea formed Swedish possessions. But, now-a-days, when the trans-Baltic lands no more belong to this country, and when the world of commerce has moved westwards, the position of Stockholm is, in certain respects, not so advantageous as before, a

TABLE 11. *Population of the cities of Sweden with more than 10,000 inhab.**

Cities.	1805.	1850.	1900.	Cities.	1805.	1850.	1900.
Stockholm	72,652	93,070	300,624	Borås	1,792	2,733	15,837
Gothenburg	12,490	26,084	130,619	Halmstad	1,324	2,761	15,362
Malmö	4,932	13,087	60,857	Sundsvall	1,471	2,837	14,831
Norrköping	9,428	16,916	41,008	Linköping	2,915	5,240	14,552
Gefle	5,930	9,261	29,522	Landskrona	3,776	4,139	14,399
Helsingborg	1,955	4,140	24,670	Eskilstuna	1,530	3,961	13,663
Karlskrona	10,553	14,097	23,955	Kalmar	3,656	6,634	12,715
Jönköping	2,964	6,008	23,143	Vesterås	2,953	3,780	11,999
Uppsala	4,897	6,952	22,855	Karlstad	2,205	3,807	11,869
Örebro	3,242	5,177	22,013	Söderhamn	1,435	1,757	11,258
Lund	3,224	6,709	16,621	Kristianstad	3,106	5,440	10,318

* Including the *suburbs*, Gothenburg has about 150,000 inhab.; Norrköping, nearly 50,000; Sundsvall and Eskilstuna, 20,000 each. — Of the *smaller cities*, not given in the table, the following may be here mentioned, with their population at the end of 1900, viz.: Falun 9,606 inhab., Luleå 9,484, Uddevalla 9,442, Visby 8,376, Hernösand 7,890, and Motala (with suburbs) 6,000 inhabitants.

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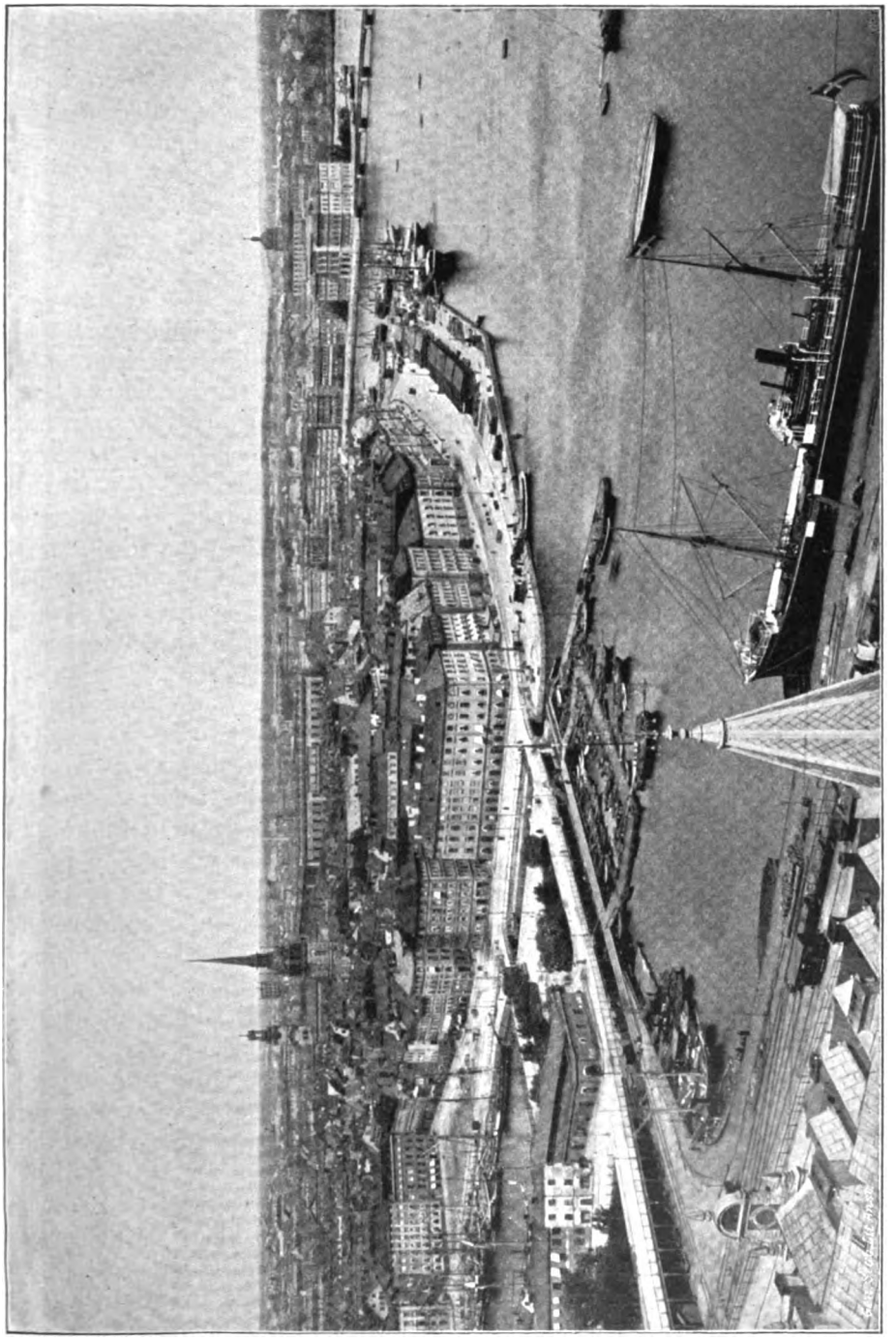

View of Stockholm from the Katarina Elevator.

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circumstance which explains the fact that Stockholm has not become the centre of Sweden to the same degree as Copenhagen, for example, is of Denmark, or Paris of France. During the last few decades, Stockholm has undergone a great development as a manufacturing town, and reckons at present 300,000 inhabitants, whereas it had not a third of that number at the middle of the century. From a tourist point of view, Stockholm is universally acknowledged as being one of the most beautiful cities in the world, and its attractiveness will make itself more and more felt in the same degree as its renown becomes spread abroad.

The second city of Sweden as to population, and the first as a seat of export-trade, is **Göteborg** (Gothenburg), situated at the mouth of the Göta-elf, where that river flows into the North Sea. Possessing at the beginning of the century (with suburbs) some 17,000 inhabitants, it now numbers 150,000 souls, or nine times as many. Gothenburg is a rich and well-built city, celebrated for a highly developed civic spirit. Gothenburg has perhaps the finest position for a commercial city in the whole of Scandinavia; of late, however, its principal development — like that of Stockholm — has been as a manufacturing town.

Both as regards population, trade, and industrial pursuits, the third town of Sweden is **Malmö**, on the Sound — the capital of Skåne, with 60,000 inh. The population at the beginning of the nineteenth century was scarcely 5,000.

Of the remaining large towns, *Norrköping*, *Borås*, *Jönköping*, and *Eskilstuna* are chiefly manufacturing towns; the first two are especially known for their textile industries, Jönköping is celebrated for its matches, and Eskilstuna for its excellent iron- and steel-ware. *Sundsvall* has, it is true, only about 20,000 inh., but it is the principal town in the world for timber-trade. *Gefle* and *Söderhamn* are also important centers for the same trade. *Uppsala* and *Lund* are the seats of Sweden's two State universities. *Karlskrona* is Sweden's chief naval station. The town of *Örebro*, on Lake Hjelmaren, is steadily developing as the centre for the midland districts of Central Sweden while, finally, *Helsingborg* is a rapidly thriving commercial and manufacturing town, situated at the narrowest part of the Sound.

Amongst the smaller towns we need here name only *Falun*, near the celebrated copper-mine of the same name; *Visby*, the noteworthy, antique capital of the island of Gotland; *Luleå*, the port where the iron-ore of Gellivare is shipped; and *Motala*, known for its excellent mechanical works. A number of the other smaller towns of Sweden are celebrated in tourist literature for their beautiful location; we may mention Södertelge, Strengnäs, Grenna, Engelholm, Marstrand, Säter, etc.

Before the rise of the great modern industries in Sweden, its towns busied themselves — apart from considerable farming — principally with commerce. It is in consequence of this that the greater

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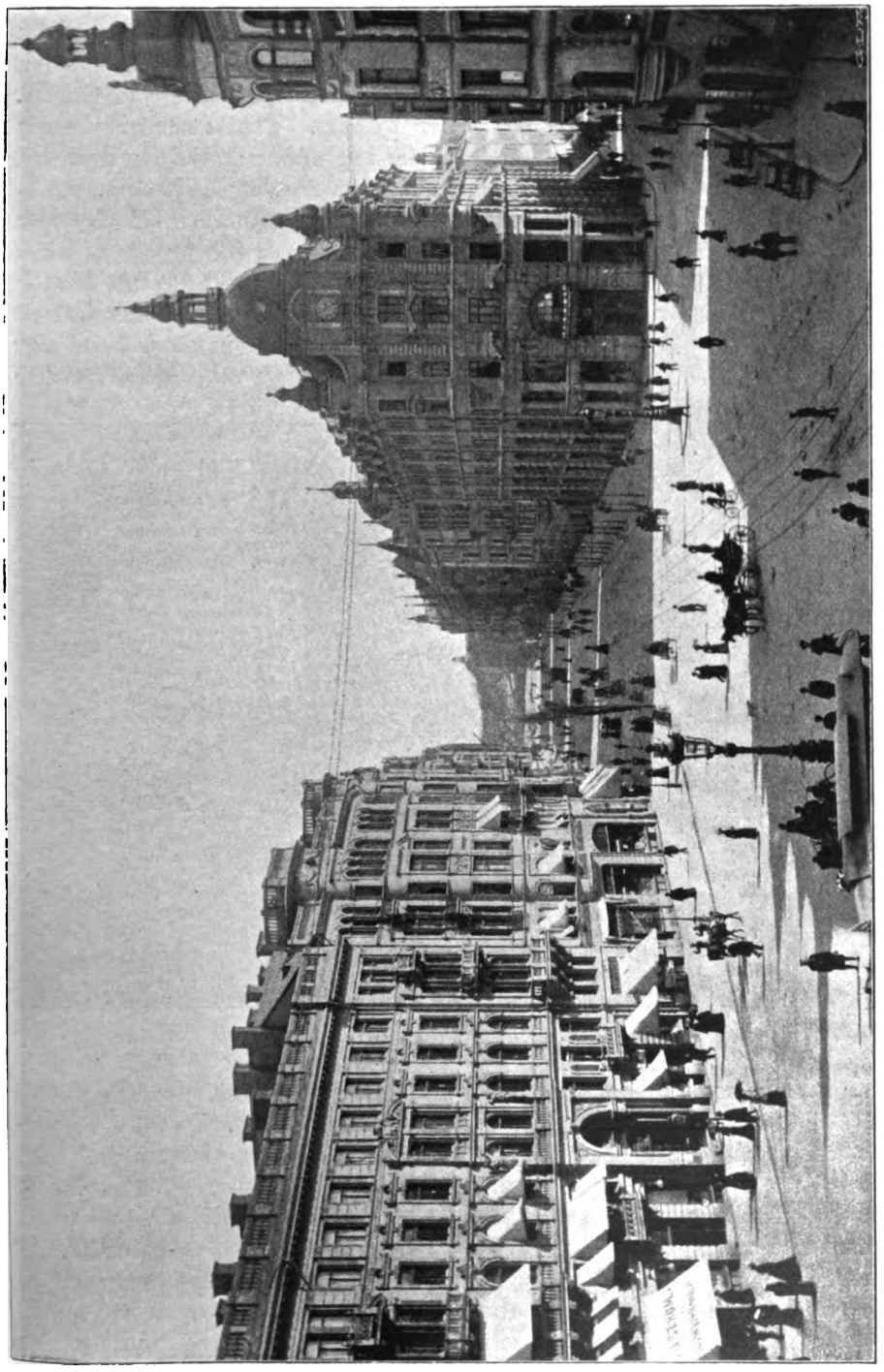

Stockholm. Stureplan.

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number of the towns lie by the sea, or near the great lakes, which gave easy communication to the ocean. At the commencement of the century, the towns on the Baltic coast (not including those on the Gulf of Bothnia) possessed 57 % of the whole urban population of Sweden. At present, this proportion has fallen to 50 %. The towns on the west coast, on the other hand, which, at the beginning of the century, had but 15 % of the entire population, now boast 25 % of the whole.

There is, as is well known, a very broad distinction between *town and country* in respect to the greater number of the problems which are treated of in vital statistics. This has been the case not least in Sweden. But, during the last few decades, this distinction has amongst us been to a great degree obliterated, *the towns having more and more nearly approached the more natural conditions of the rural districts.* The

In Gothenburg.

towns have thus made very great progress during this epoch as regards wealth and a more careful communal administration. It may be mentioned, for instance, that the hygienic arrangements of Stockholm and also of several other places in Sweden have been regarded abroad as most exemplary. And even the smaller towns of Sweden nowadays possess a most attractive appearance in consequence of their cleanliness and order. In consequence of their spaciousness with regard to premises — a feature peculiar to Sweden — the towns are considerably larger in extent than might be expected from the small number of the population.

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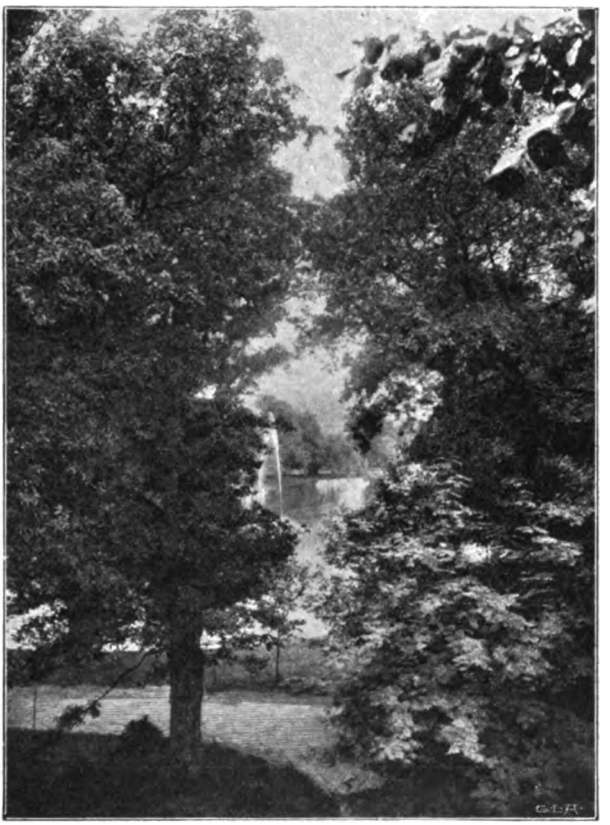
Division of the population according to age.

The preceding pages have spoken of the total population of Sweden, and of the division of this population over the area of the country, as well as in the two classes of communities called town and country. If we now proceed to the more specially demographical problems, the most important point of view which presents itself is the one which stands as the title of this section — the division of the population *according to age*. Table 12 (next page) shows the respective figures for Sweden during the last 150 years.



The Park Slottsskogsparken in Gothenburg.

In Sweden, as in Western Europe generally, the group 0/15 thus claims about one third of the population; a proportion which has not very materially changed during the lapse of time. The group 15/50 has reckoned (during the period 1751/1875), on an average, 500,598 persons per million, being thus quite up to the normal proportion, but since the rise of emigration, these figures have diminished very considerably. During the period of emigration, the group 50/ω has risen from its normal sixth part (166,458 persons per million, during the period 1751/1875) to quite one fifth of the whole.

At present, the population of Sweden is divided according to age in a very peculiar manner. An idea of this may be gathered from Table 13 (page 112).

Both the great inferiority in numbers of the groups 0/5 and 20/50, and the excess in numbers of the groups 5/20 and 50/ω are exactly what might be expected from the great emigration. The abnormal excess of numbers in the

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TABLE 12. *Population by age, per 1 million inhab.*

Average for the years	0/15 years.	15/50 years.	50/ω years.	15/30 years.	30/50 years.	50/65 years.	65/ω years.
1751/1875	**332,944**	**500,598**	**166,458**	**253,875**	**246,723**	**113,824**	**52,634**
1751/75	336,427	495,054	168,519	250,541	244,513	111,926	56,593
1776/00	320,518	507,493	171,989	253,051	254,442	119,358	52,631
1801/25	323,782	502,024	174,194	254,410	247,614	120,765	53,429
1826/50	341,475	498,467	160,058	259,424	239,043	109,973	50,085
1851/75	337,199	500,264	162,537	251,269	248,995	110,308	52,229
1876/95	329,919	474,628	195,453	246,745	227,883	127,889	67,564
In 1895	329,389	464,562	206,049	235,485	229,077	124,977	81,072

group 50/ω, cannot, however, be explained by this fact *alone*. To be able to entirely understand the phenomenon, it must be remembered that a great part of these ages now include groups which were unusually rich in numbers already from the births, and which, moreover, had reached such an age on the rise of emigration that they escaped the decimation which so much the more reduced the numbers of those forming the younger groups of the population. It may also be mentioned that the actual groups now include those persons who were the first in our land to receive the blessing of that great benefit to humanity, called vaccination. Several conditions have thus united to give to the country, for the moment, a disproportionately numerous population in the group including the highest ages — a circumstance which contributes, in a very unwelcome manner, to increase the burden of poor-relief. Also the excess in numbers of the group 5/15 years, is an economical burden, on account of the great demands upon the resources of the parents or of the community, for instruction and education. An excess of school-children and of old people, and a want of able-bodied persons — that is the present condition of the population in Sweden and it is doubtlessly a noteworthy weakness, and one with which our economical development will have to contend.

Population according to sex.

At the close of 1900, Sweden possessed 2,506,436 inhabitants of the male sex and 2,630,005 of the female sex, this giving a proportion of 1,049 women to every thousand of men. The proportion for the whole

TABLE 13. *Population by age, per 1 million inhab., 1895.*

Age.	1751—1875.	1895.	1895, by ‰.*	Age.	1751—1875.	1895.	1895, by ‰.*
0/5 years	128,918	117,628	912	45/50 years	51,369	48,767	949
5/10 »	104,846	109,300	1,042	50/55 »	45,160	46,152	1,022
10/15 »	99,180	102,461	1,033	55/60 »	37,364	40,759	1,091
15/20 »	91,895	93,985	1,023	60/65 »	31,300	38,066	1,216
20/25 »	84,497	77,096	912	65/70 »	23,020	31,482	1,368
25/30 »	77,483	64,404	831	70/75 »	15,683	25,718	1,640
30/35 »	71,689	65,845	918	75/80 »	8,631	14,556	1,686
35/40 »	64,726	61,022	943	80/ω »	5,300	9,316	1,758
40/45 »	58,939	53,443	907	Total	1 mill.	1 mill.	—

* I. e. the numbers for 1895 expressing relation by ‰ to corresponding numbers of 1751/1875.

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of Europe is, according to the newest statistics, 1,026 women to every thousand of men; in Western Europe especially, the proportion of women rises to 1,034. The excess of women is thus unusually large in Sweden, and is exceeded only in the countries of Norway, Scotland, Portugal, and — possibly — Switzerland.

In Sweden the difference was even greater in former times. In 1750 there were 1,129 women to every thousand of men — the greatest disproportion ever noted in Europe. How this condition of things has since developed may be seen — grouped according to age — by Table 14.

TABLE 14. *Number of women per 1,000 men.*

Average for the years.	Total.	0/15 years.	15/20 years.	20/25 years.	25/30 years.	30/35 years.	35/40 years.	40/45 years.	45/55 years.	55/65 years.	65/ω years.
In 1750....	**1,129**	1,006	1,067	1,139	1,122	1,106	1,099	1,148	1,209	1,457	1,520
1751/75....	**1,107**	1,005	1,037	1,137	1,138	1,122	1,102	1,116	1,174	1,291	1,501
1776/00....	**1,077**	996	1,033	1,097	1,108	1,087	1,081	1,077	1,123	1,202	1,360
1801/25....	**1,086**	998	1,017	1,079	1,088	1,104	1,114	1,134	1,154	1,231	1,394
1826/50....	**1,071**	997	1,011	1,028	1,034	1,046	1,066	1,101	1,169	1,286	1,482
1851/75....	**1,061**	989	1,003	1,026	1,054	1,065	1,069	1,105	1,121	1,220	1,439
1876/95....	**1,061**	977	983	1,025	1,068	1,104	1,116	1,121	1,135	1,167	1,315
In 1895....	**1,059**	974	969	1,010	1,061	1,097	1,133	1,116	1,146	1,174	1,269

With the exception of the years of war, the period between 1750 and 1865 saw, on the whole, a restoration of the balance in numbers of the two sexes, but this movement has since been broken off by emigration, which, during the forty-five years 1851/95, occasioned a loss of 462,000 men as compared with but 329,000 women. The fact that, in spite of this great inequality in the numbers of the sexes in the matter of emigration, the excess of women in the population of Sweden has not increased but has been stationary, or at least nearly so, must be ascribed to the remarkable circumstance that, after the commencement of emigration, the division of the number of both births and deaths, considered from the point of view of sex, has become much more favourable as regards the male members of the population. Still more peculiar is the fact that this change is most marked in that part of the country from which emigration was greatest.

The relative proportion of sexes is of importance especially with reference to *unmarried persons of middle age.* Of unmarried men between the ages 20/50 years, there were in Sweden, at the end of 1895, 390,862, and of unmarried women between the ages of 17/45 years, 502,073. According to this grouping, we obtain the proportion of no less than 1,285 women to one thousand men. These figures are calculated as having been no less than 1,442 to a thousand, for the years 1751/75. In this case too an improvement has taken place, but one which also was interrupted by the rise of emigration. Making

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a similar calculation for the whole of Western Europe, for the years 1871/80, we find, on an average, 1,086 women to a thousand men. In Italy the figures were 938 to a thousand, in France, 970 to a thousand; thus showing an excess of unmarried men. In Norway, on the other hand, the proportion of women to men rose to more than 1,300 to a thousand, showing a still greater disproportion than here in Sweden.

TABLE 15. *Movement of population, 1881/90, in the Swedish läns.*[1]

Län.	Increase of population, ‰	Because of		Per annum and per 1,000 inhabitants.				Special expressions for the frequency of		
		Excess of births.	Migration.[2]	Marriages.	Births.	Deaths.	Excess of emigration.[3]	Marriages.[4]	Legit. births.[5]	Illegit. births.[6]
Stockholm, city.	+36·74	9·79	**26·95**	8·86	32·89	**22·60**	6·68	57·0	259	62·0
Stockholm, prov.	+ 3·81	10·41	6·60	6·49	28·53	18·12	2·00	93·6	257	42·1
Uppsala	+ 8·64	10·37	1·73	6·87	28·96	18·59	2·10	89 2	259	41·9
Södermanland	+ 5·19	11·55	6·36	6·61	28·74	17·19	2·91	105·0	263	41·7
Östergötland	— 0·19	11·06	11·25	6·03	26·68	15·57	9·19	76·6	270	33·3
Jönköping	— 1·81	13·15	14·46	5·68	27·98	14·78	12·09	75·9	315	22·2
Kronoberg	— 5·86	11·96	17·82	5·30	27·97	16·01	11·94	70·0	321	24·8
Kalmar	— 5·12	10·07	15·19	5·44	26·00	15·93	10·00	76·4	278	31·2
Gotland	— 6·83	4·65	10·98	5·62	20·17	15·52	8·89	72·1	190	26·1
Blekinge	+ 3·65	12·92	9·27	5·88	31·19	18·27	7·27	72·6	321	44·0
Kristianstad	— 3·94	9·90	13·84	5·74	27·06	17·16	9·28	67·3	291	35·0
Malmöhus	+ 5·45	11·41	5·96	6·41	29·01	17·60	7·42	73·7	281	33·2
Halland	+ 0·59	11·78	11·19	5·62	27·93	16·15	12·08	66·6	312	25·3
Göteb. och Bohus	+13·11	11·89	**1·22**	6·81	29·62	17·73	5·12	67·3	308	29·8
Elfsborg	— 4·67	10·65	15·32	5·45	25·94	15·29	10·84	60·1	307	19·8
Skaraborg	— 4·29	11·76	16·05	5·55	26·37	14·61	8·97	64·8	308	21·8
Vermland	— 5·82	11·11	16·93	5·13	25·28	14·17	11·78	58·0	294	32·4
Örebro	+ 0·16	12·95	12·79	5·78	27·90	14·95	7·77	72·4	295	39·9
Vestmanland	+ 6·78	11·52	4·74	6·90	29·87	18·85	3·52	98·7	259	49·1
Kopparberg	+ 3·77	12·78	9·01	6·10	30·19	17·41	6·29	89·0	284	37·9
Gefleborg	+14·69	15·23	0·54	7·05	33·53	18·30	5·15	105·2	284	60·4
Vesternorrland	+21·21	18·67	**2·54**	7·45	37·28	18·61	2·78	109·9	326	53·9
Jemtland	+18·16	17·22	**0·94**	7·24	33·15	15·93	4·43	114·7	305	68·6
Vesterbotten	+14·36	18·30	3·94	7·13	35·23	16·93	1·83	97·1	356	24·0
Norrbotten	+14·50	15·97	1·47	7·38	37·53	21·56	2·86	104·7	366	39·0
Rural districts	+ 0·26	12·29	12·03	5·97	28·65	16·86	7·50	81·2	295	33·5
Cities	+26·22	11·33	**14·89**	7·67	31·07	19·74	7·07	60·7	279	45·6
Total	+ 4·69	**12·12**	7·43	**6·26**	**29·06**	**16·94**	7·43	75·9	**292**	**36·7**

[1] The first seven columns show yearly averages per 1,000 inhab. of the mean population. Hence Increase, ‰ = increase per 1,000 inhab. and per annum; Excess of births = more births than deaths per 1,000 inhab. and per annum; Migration = yearly loss or gain by emigration or immigration per 1,000 inhab., etc. — [2] Heavy numbers in this column (for Stockholm, Göteborg och Bohus, Vesternorrland, Jemtland, and the Cities) denote excess of immigration over emigration; other numbers excess of emigration. — [3] I. e. yearly excess of emigration from Sweden to immigration into Sweden per 1,000 inhab. (no such excess of immigration in any län). A comparison of this column with the third (Migration) will show which läns have gained or lost by the exchange of population *within* the country. — [4] I. e. the yearly number of women married the first time per 1,000 unmarried women between 20 and 45 years. — [5] I. e. the yearly number of women bearing children in wedlock per 1,000 married women between 15 and 45 years. — [6] I. e. the yearly number of women bearing illegitimate children per 1,000 unmarried women, widows and divorced between 20 and 45 years.

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The movement of population in different »läns».

The division of the population according to place of living, sex, age, occupation, etc. constitutes what is called at times the *Stand of the population*. The changes among the people by marriages, births, deaths, immigration, and emigration constitute the second division of demography and is called the *Movement of the population*. Each one of the chapters belonging to this division is in the following pages treated by itself; but, in order to save space, the principal data for the different läns are collected and given in Table 15, p. 114. This table relates to the decade 1881/90, the latest period for which more special calculations can yet be made. The contents of the table can be partly seen on the maps following and the subject is again touched upon at the presentation of the figures for the entire country; some of its principal features are already pointed out on p. 92. We must remember that the decade which has just ended (1891/1900) is marked by a considerably smaller emigration than the period 1881/90, and thus also by a greater increase of population. From 1880 to 1890 the population was lessened in nine läns, as shown by Table 15, and from 1890 to 1900, only in four (Kronoberg, Kalmar, Kristianstad, and Skaraborg); the figures for the yearly increase during the last mentioned decade are given on p. 98.

Civil condition and marriages.

The fairest picture of Sweden's demography is that presented by the chapter on mortality; the most unsatisfactory, that presented by the chapter dealing with the statistics of marriages, and with those of emigration.

The division of the population of Sweden as regards their **civil condition** during the period 1751/1895 is given, in relative numbers, by Table 16.

TABLE 16. *Distribution of the population according to civil condition, per 1 million inhab.**

Average for the years	Children (under 15 years).	Unmarried.			Married.		Widowers and widows.	
		15/20 years.	20/50 years.	50/ω years.	15/50 years.	50/ω years.	Widowers.	Widows.
1751/75	336,427	87,524	139,833	9,057	257,321	107,995	12,812	49,031
1776/00	320,518	86,025	156,184	9,739	251,946	111,970	15,686	47,932
1801/25	323,782	89,233	152,122	11,712	246,198	109,463	16,057	51,433
1826/50	341,475	96,744	149,348	13,102	239,052	96,731	15,595	47,953
1851/75	337,199	91,419	166,251	15,260	230,196	98,669	17,125	43,881
1876/95	329,919	93,230	162,176	22,127	209,608	122,868	18,103	41,969
In 1895	329,389	93,482	159,997	25,143	201,812	128,023	19,614	42,540

* Partly by approximate calculations.

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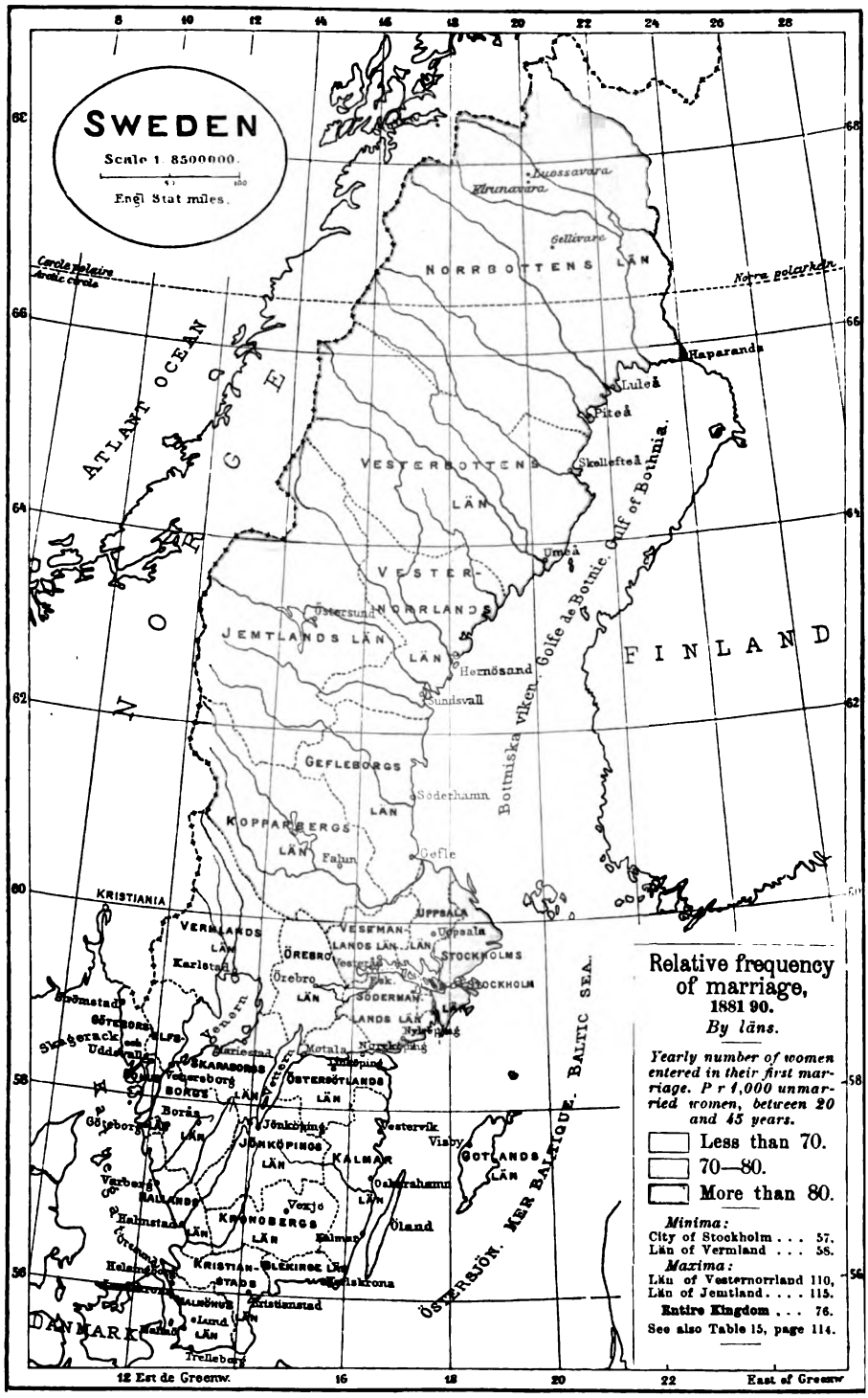

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Thus, it is seen that, during the years 1751/75, there were, on an average, 257,321 married persons under fifty years of age to every million of the inhabitants. In 1895 this number had fallen to 201,812 per million. The average figure for Western Europe, in our days, is 251,900 per million, that is, about the same that was found in Sweden during the eighteenth century.

If we pay attention only to the number of the *married women between the ages of 15/45* — an age-group which is the most suitable as a means of comparison with the number of births — we find it, as a whole and for different ages, to have changed in the manner which is shown by Table 17.

TABLE 17. *Married women between 15/45 years, per 1 million inhabitants.**

Average for the years	15/45 years.	15/30 years.	30/45 years.	15/20 years.	20/25 years.	25/30 years.	30/35 years.	35/40 years.	40/45 years.
1751/75	**113,637**	35,305	78,332	1,854	10,958	22,493	27,008	26,528	24,796
1776/00	**110,416**	33,381	77,035	1,649	10,175	21,557	26,142	26,376	24,517
1801/25	**108,858**	32,587	76,271	1,208	9,999	21,380	26,139	25,930	24,202
1826/50	**103,974**	30,145	73,829	685	8,788	20,672	25,429	25,276	23,124
1851/75	**99,087**	26,044	73,043	454	7,038	18,552	24,625	25,396	23,022
1876/95	**90,418**	25,334	65,084	496	7,307	17,531	21,808	22,201	21,075
In 1895	**87,963**	22,775	65,188	494	6,824	15,457	21,964	22,751	20,473

The total number of married women between the ages 15/45 has thus fallen from 113,637 per million of the total population to 87,963 per million. (The present average for Western Europe is about 113,000 per million). Between the ages of 15/20 the decline is, however, from 1,854 to only 494; between 20/25 from 10,958 to 6,824, and between the ages 25/30 from 22,493 to 15,457. The whole group between the ages of 15/30 has thus fallen from 35,305 to 22,775 or by 35 %; the decline in the group between the ages 30/45 is, on the contrary, but 17 %. It can thus be clearly seen how the decline in the frequency of marriage implies in the first place *retardated entry into the married state.*

It would, however, not be quite correct to imagine that the percentage of the *unmarried* has increased in the degree that might be supposed from the numbers given above. The case really is that a great number of the young people who have not found an opportunity of entering into the married state, have *emigrated.* In consequence of this, the percentage of married out of the remaining population, is able to be held at a much higher figure than one might expect from the decline in the frequency of marriages. These conditions, both for older and newer times, are shown by Table 18 (next page).

From this table we see that no very considerable diminution in the number of married has taken place during the *last few decades*, and, as regards the younger ages, we find now no diminution at all. Counting from the period 1851/75 to 1895, we find that the number of married men in the age of 20/25 years has *risen* from 7·3 to 7·5 % and in the age of 25/30 years has fallen only from 38·7 to 38·1 %. Among the women the frequency of married has risen in both the groups 15/20 and 20/25 years, in the first one from 1·0 to

* Groups of five years before 1870 according to approximate calculations.

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TABLE 18. *Percentage of married within different ages.**

Average for the years	Married *men* per 100 in the ages of				Married *women* per 100 in the ages of					
	20/50.	20/25.	25/30.	30/50.	20/45.	15/20.	20/25.	25/30.	30/35.	35/40.
1751/75	64·6	14·4	52·4	86·0	59·2	4·1	24·5	55·0	70·5	78·9
1776/00	60·7	12·0	45·4	81·9	56·7	3·7	22·7	51·6	67·5	76·6
1801/25	59·8	11·6	45·4	81·5	57·2	2·7	22·6	52·2	69·7	76·6
1826/50	59·1	9·9	44·1	82·1	57·5	1·4	20·3	53·1	71·7	78·4
1851/75	56·1	7·3	38·7	78·1	53·8	1·0	17·4	47·2	66·5	74·2
1876/95	54·5	7·3	39·6	76·7	52·4	1·1	17·8	47·3	64·6	72·0
In 1895	53·7	7·5	38·1	74·5	52·4	1·1	17·6	46·6	63·8	70·2

1·1 % and in the latter from 17·4 to 17·6 %. Even if no importance can be attached to these small changes, it is at least plain that the retardation of marriages has taken an end. The same is also shown by the *average age* on entering in marriage, which during the last decades has rather fallen than risen.

Even if marriages in this country are entered into at a retarded period, still the number of those persons who do not marry at all, is comparatively small. Of the population of Sweden above 50 years of age there were in 1890 only 8·7 % of the men and 14·6 % of the women who were not married: the corresponding figures for the whole of Western Europe are for men 10 %, and for women 12·2 %. Thus, the figures for Sweden are below the average as regards the men.

If we look for the *causes* of the diminished frequency of marriages in Sweden, it is of the utmost importance first to find out when this diminution began. Looking through Tables 18 and 19, we find that the period 1751/75 (on the average) is marked by a very great frequency of marriages, which, in a good many ways, must be regarded as exceptional (and would be regarded so anywhere in Western Europe). We also find that the half-century 1776/1825 shows little or no decrease. Thus, the entire loss can, on the whole, be said to fall on the period after 1825 (or really after 1835).

Concerning the period 1826/50 (or really 1836/60), the very low figures can be explained by the abnormal excess during this time of the population in youthful ages, resulting from the great number of births after the end of the Napoleonic wars. The scarcity of work for many people resulting from this condition very naturally diminished the possibilities of marriage (and this same condition has probably not an unimportant share in the troubles and disturbances on the European continent in 1848). It is also during 1836/60 that the *retardation* of marriage took place in this country.

The diminished frequency of marriages not dependent on the above mentioned conditions, began only *after 1860*. Thus the real cause of this diminution can be no other than the fact that Sweden during this time has been drawn away from its former, more isolated, industrial life and has entered into that of universal competition under conditions which were extremely unfavourable — as will be shown in the section treating of the economics of Sweden. In this way, both the

* Before 1870, the numbers are by approximate estimation, made, however, on data insuring a high degree of probability.

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diminished frequency of marriages and the beginning of emigration is really explicated. In the same degree as the difficulties in the economical life of Sweden disappear — and signs of such disappearance are already noticeable — the deplorable phenomena we have described will be conquered. But, nevertheless, we must confess that the diminished frequency of marriages can partly be ascribed to the steadily rising economical pretentions of those entering married life, and the consequent difficulty of caring for a family. Doubtlessly some importance must also be attached to the decrease of mortality and its result, a delayed inheritance of livelihood — as pointed out especially by WICKSELL and FLODSTRÖM —, though the decrease of mortality also, in part, has a contrary effect, in so far as, by increasing prosperity, it also promotes the opportunities of gaining a livelihood.

Marriages contracted. The account just given was intended to illustrate the division of the population according to the civil condition. We have now to give some description of the ordinary demographical details concerning the marriages contracted. The principal figures can be seen from Table 19.

TABLE 19. *Relative number of marriages.*

Average for the years	Marriages per 1 million inh.	Per 1 million inh.		Wedded per 1,000 unmarried, 20/50 years.	Per 1 million inh.		Wedded per 1,000 unmarried, 20/45 years.	Per 1 million inhab. wedded	
		Unmarried men, 20/50 years.	Wedded men, first marriage.		Unmarried women, 20/45 years.	Wedded women, first marriage.		widowers.	widows.
1751/75....	8,684	65,253	7,234	110·9	72,195	7,633	105·7	1,450	1,051
1776/00....	8,369	76,172	6,956	91·3	77,055	7,315	94·9	1,413	1,054
1801/25....	8,595	74,733	7,189	96·2	74,208	7,549	101·7	1,406	1,046
1826/50....	7,310	75,876	6,339	83·5	70,457	6,638	94·2	971	672
1851/75....	7,041	83,281	6,242	74·9	78,987	6,595	83·5	799	446
1876/95....	6,213	80,103	5,554	69·3	77,396	5,917	76·4	659	296
1886/95....	5,931	79,182	5,312	67·1	76,691	5,666	73·9	619	265

We must first point out the extraordinary decline in the number of those **marrying a second time**, a circumstance which, no doubt, stands in connection with the decline in mortality. At the present time, second marriages are less frequent in this country than in any other land in our quarter of the globe.

The **average age** for marriage has been, during the years 1891/95, for men 30·68 years, and for women 27·64 years. The difference in age thus amounts to 3·04 years: this difference was formerly unusually small in Sweden but has somewhat increased of later years. As regards first marriages alone, the average age of men is taken to be 28·88 years, and of women, 27·02 years; on second marriages, the men's age is given at 45·76 years and women's, 41·05 years.

Of the persons entered into marriage in the years 1891/95, 0·43 % of the men and 12·44 % of the women were less than 21 years of age. These figures are the lowest of their kind in the whole of Europe. From a physical, moral, and social point of view, the Swedish writer EMIL SVENSÉN has thoroughly investigated the subject of *premature* marriages. Among nations where premature marriages are common, he finds generally a want of physical and spiritual strength and, to a certain extent, everything resting on a weak foundation (infantism); perfect physical and spiritual development belong to those nations where marriages are made at more mature ages. Thus, the figures shown above must be considered as very favourable for Sweden. Also, in no other nation is the minimum age for the marriage of the women held as high as in Sweden (for the present 17 years).

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Characteristic differences are usually found regarding the **season of the year** in which marriages are celebrated in different countries. In Sweden, during the years 1881/90, as much as 16·9 % of all marriages took place in December; 14·4 % in November, and 13·2 % in October: thus, 44·5 % in all, during the last quarter of the year. During the first quarter, on the other hand, but 14·1 % were entered into. These differences were more pronounced in former times, and nowadays are found more in the country than in towns.

During the last few decades the frequency of marriage has varied considerably in the different **provinces** of Sweden. The map on page 116 shows very plainly the superiority in this matter of North Sweden, where the timber-trade offers many opportunities for work at high wages, contrasting with South Sweden, where agriculture is the chief employment of the people.

Births.

As may be seen by Table 5, the annual number of births, which, in the years 1751/75, amounted to 34·44 °/₀₀ of the population, has since that date almost uninterruptedly declined so that for the period 1876/1900, the figures are but about 28·51 °/₀₀.

But it would, of a certainty, be wrong to deduce from this that *conjugal fecundity* has lessened. It appears from Table 20 that, during the years 1751/1800, to every thousand of married women between the ages of 15/45, there were, on a yearly average, 294 who gave birth to legitimate children: the average for the years 1851/1900 is about 292, or almost the same as for the first period. The decrease which really exists in the number of births is, therefore, a consequence only of the decrease in the frequency of marriage.

The average number for Western Europe is about 270 °/₀₀ but, if France be omitted, about 290 °/₀₀. The fecundity in Sweden is thus fully normal. When we recollect that, in this country, marriage is contracted at a later age than in other lands, the conclusion must rather be drawn that fecundity in Sweden is greater than in most other countries.

TABLE 20. *Relative number of women bearing children.**

Average for the years	Per 1 million inhab.		Mothers, °/₀₀.	Per 1 million inhab.		Mothers, °/₀₀.	Per 1 million inhab.		Mothers, °/₀₀.
	Women, 20/45 years.	Women bearing children.		Married women, 15/45 years.	Mothers of legit. children.		Unmarried women, 20/45 years.	Mothers of illegitim. children.	
1751/75.....	189,729	34,783	183·3	113,637	33,872	298·3	77,946	911	11·7
1776/00.....	191,676	33,479	174·7	110,416	32,017	290·0	82,909	1,462	17·6
1801/25.....	188,107	33,246	176·7	108,858	30,967	284·5	80,457	2,279	28·3
1826/50.....	179,655	32,183	179·1	103,974	29,725	285·9	76,366	2,458	32·2
1851/75.....	183,176	32,346	176·6	99,087	29,188	294·6	84,543	3,158	37·4
1876/95.....	171,471	29,333	171·1	90,418	26,309	291·0	81,549	3,024	37·1
1886/95.....	169,891	28,445	167·4	89,675	25,471	284·0	80,692	2,974	36·9

* For older dates in part by approximate calculations.

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Matrimonial fecundity, 1881/90.

By läns.

Yearly number of women bearing children in wedlock. Per 1,000 of married women between 15 and 45 years.

- Less than 290.
- 290—320.
- More than 320.

Minima:
Län of Gotland 190,
Län of Stockholm, prov. 257.

Maxima:
Län of Vesterbotten . . 356,
Län of Norrbotten . . . 366.
Entire Kingdom . . . 293.

Regarding the boundary lines ▬ cf. p. 92. See also Table 15, page 114.

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TABLE 21. *Relative number, by age, of women bearing children.*

Average for the years	Women bearing children, per 1,000 women, within each age.[1]							Women bearing legitimate children per 1,000 married women, within each age.[2]					
	15/20.	20/25.	25/30.	30/35.	35/40.	40/45.	45/50.	20/25.	25/30.	30/35.	35/40.	40/45.	45/50.
1751/75.....	23	122	220	238	191	100	24	474	388	332	238	123	31
1776/00.....	21	116	207	226	182	95	23	467	381	325	232	121	30
1801/25.....	16	119	214	229	185	98	20	457	377	312	232	124	27
1826/50.....	10	109	217	242	198	107	18	454	373	314	242	134	24
1851/75.....	8	101	204	233	203	118	19	466	380	326	260	152	25
1876/95.....	11	107	201	221	192	110	17	454	376	320	255	145	23
1886/95.....	11	108	196	214	185	105	15	451	369	312	248	139	21

Table 21 gives an historical view of the number of births, and of fecundity, at different ages — a table which is unique in its way.

The most remarkable feature in this table is the important increase of matrimonial fecundity shown by the ages 35/45, during the period 1826/1875. The circumstance clearly depends upon the retardation of marriage which went on during a great part of that time. The same table also shows very clearly that fecundity has not lessened to any great degree, especially omitting the abnormal period 1751/75.

We here find place for some of the chief facts concerning births, out of those with which we are so richly supplied by the Swedish statistics of population.

The living-born children in the years 1751/75 were divided according to **sex** in the proportion of a thousand girls to 1,044 boys. At present (1876/95) the numbers are a thousand girls to 1,054 boys — figures which are about the same as those for Europe in general. During the same period, the relative number of boys amongst the total number of births (thus including those still-born) has risen from 1,051 to 1,061.

Of the total number of births during 1751/55 there were, on the average, 25 ‰ **still-born.** Omitting the years 1801/20, this frequency was gradually increased until the years 1861/65 when they reached 33 ‰; since then, a considerable diminution has taken place. At present, the number of still-born children amounts to 26 ‰ — a low proportion when compared with that of most of the other European countries.

Several children at a birth occur in Sweden more frequently than in any other country of Europe, excepting Finland. During the period 1750/1815 the frequency of such births rose very considerably: from 1,014·7 children born of every thousand of mothers, to about 1,018 births. After that date the frequency fell again. During the last fifty years, the number has been nearly constant, or about 1,014·5 children to every thousand of mothers. During the years 1871/90, the proportion, taken for legitimate and illegitimate children separately, was 1,014·54 and 1,014·99 to one thousand mothers.

Regarding births according to the **seasons,** we find the greatest proportion born in September and March (6 to 7 % *higher* than the average for the year) and the lowest in July and August (7 % *beneath* the average). The percentage of illegitimate births of the total number, is greatest during the period January —July. The frequency of still-born children is always greater during the cold season of the year than during the warm.

[1] For 1751/75 by approximate calculations. — [2] Before 1870, partly by approximation. For the ages 20/30 these approximations are only tentative, but probably measurably correct.

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Mortality.

During the decade 1891/1900, the average yearly number of deaths in Sweden amounted to but 16·36 per thousand of the population — the *lowest figure ever observed in any European country.* Lower figures have sometimes been given for certain districts in America and Australia, but they cannot be regarded as reliable. It is, therefore, highly probable that this Swedish figure is the lowest ever observed in the whole world.

TABLE 22. *Mortality in Sweden, compared with some other countries.*

Average for the years	Death-rate, ‰.					Death-rate in Sweden in % of the death-rate of			
	Western Europe.	Sweden.	Norway.	England.	France.	Western Europe.	Norway.	England.	France.
1801/20	28·0	26·8	23·1	·	27·8	96	116	·	98
1821/40	26·7	23·2	19·6	·	24·7	87	118	·	94
1841/60	26·2	21·2	17·6	22·3	23·5	81	120	95	90
1861/70	26·1	20·2	18·0	22·5	23·6	77	112	90	86
1871/80	25·7	18·3	17·0	21·4	23·7	71	108	86	77
1881/90	24·0	16·9	17·1	19·2	22·2	70	99	88	76
1886/95	23·3	16·5	16·9	18·8	22·2	71	98	88	74

Table 7 gave a view of the history of mortality in this country during the last two centuries, and Table 22 makes a comparison between Sweden and some other countries, for the century which has just come to an end. It may be seen very clearly by means of this last table how the position of Sweden has, in the course of time, become more and more favourable. If the rate of mortality in Sweden is compared with that of the whole of Western Europe, the rate in Sweden will for the period 1801/20 be found to be only 4 % lower than that of the entire continent; but from 1886/95 it is 29 % lower. The mortality in Norway formerly used to be lower than that of Sweden, but now the death-rate of Sweden is rather the lesser. During the period 1801/20, the figures for France and Sweden were almost equal; at present, the mortality in Sweden is 25 % lower than that in France. The Swedish figures are, at present, 12 % lower than those of England; during the period 1841/60, the advantage was only 5 %.

During the ten years 1886/95, the total average death-rate per thousand was: for Sweden, 16·5; Norway, 16·9; Denmark, 18·6; England, 18·8; Scotland, 19·0; Netherlands, 20·0; Belgium, 20·3; Switzerland, 20·3; Finland, 20·3; France 22·2; the German Empire, 23·8; Italy, 26·5; the west of Austria, 27·0; Servia 27·7; Galicia-Bukovina, 31·2; Hungary, 31·8; Russia, 33·9; the whole of Western Europe, 23·3; Eastern Europe, 33·0; the whole of Europe, 27·1.

The great decrease of mortality in Sweden during the 19th century is an incontrovertible proof of the progress made, during this period, by the nation, not only in civilization, but also in material welfare.

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Death-rates 1886/95.

Yearly number of deaths per 1,000 inh. of the mean population.

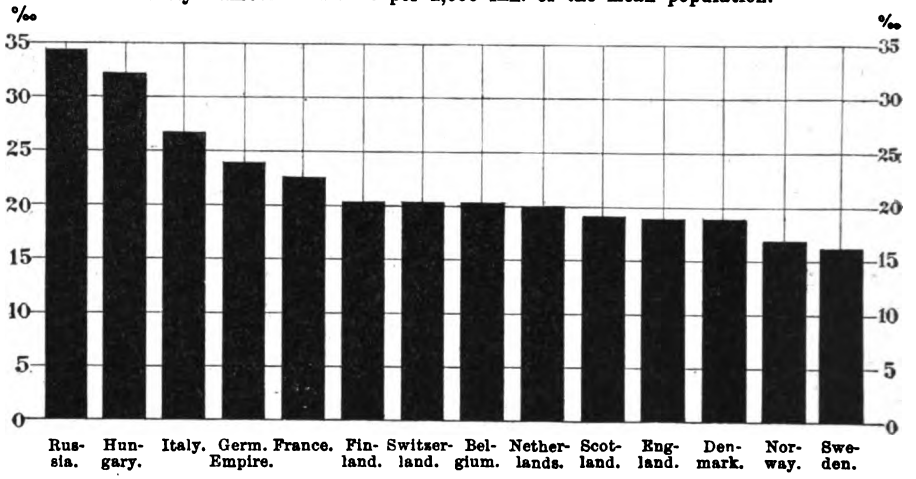

Table 23 gives a comparison, according to age, between the rates of mortality of Sweden on one hand, and those of Western Europe, France, and England on the other. It is very evident that our position in every case is the most favourable during the first years of life, but not, by any means, exclusively in these. In the group, 0/5 years, the mortality in Sweden is 41 % lower than in Western Europe, 34 % lower than in France, and 31 % lower than in England. If we regard the first year of life alone, the difference becomes generally still more favourable to us.

Our position is, on the other hand, less favourable for the age-group 5/15, and especially for the period 5/10 years, the time when contagious children's diseases are rife, and which thus forms "the Achilles-

TABLE 23. *Death-rates by age, in Sweden, compared with other countries.*

Age.	Death-rates, 1871/80, ‰.		Sweden, %	Death-rates. 1881/90, ‰.		Sweden, %	Death-rates, 1886/95, ‰.		Sweden, %
	Western Europe.	Sweden.		France.	Sweden.		England.	Sweden.	
0/5 years...	89·21	52·27	59	65·91	43·55	66	56·99	39·15	69
5/10 » ...	8·83	8·49	96	6·24	7·74	124	4·68	6·65	142
10/15 » ...	4·62	4·18	90	4·01	4·03	100	2·72	3·71	136
15/20 » ...	5·99	4·50	75	6·09	4·53	74	4·05	4·56	113
20/25 » ...	8·34	6·28	75	7·50	5·92	79	5·20	6·06	117
25/35 » ...	9·61	7·34	76	9·42	6·55	70	7·04	6·48	92
35/45 » ...	12·15	9·27	76	11·12	8·17	73	11·15	7·95	71
45/55 » ...	17·21	13·05	76	15·32	11·51	75	17·29	11·07	64
55/65 » ...	31·51	23·52	75	28·14	21·08	75	32·32	20·38	63
65/75 » ...	69·39	53·57	77	62·64	47·09	75	66·64	46·28	69
75/ω » ...	164·32	141·55	86	146·09	134·88	92	180·05	132·21	73
Total	**25·65**	**18·27**	**71**	**22·23**	**16·94**	**76**	**18·81**	**16·49**	**88**

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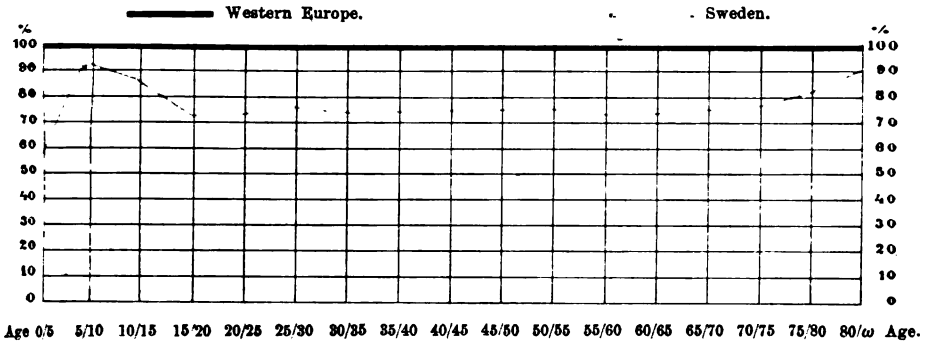
Percentage of death-rates in Sweden as compared with corresponding death-rates in Western Europe as a whole, 1871/80.



heel" of the poorer and less populated countries. The well-populated lands here easily win an advantage, by means of their greater resources in the necessary medical aid.

The mortality in Sweden in every age-group between the years 15 and 75 is about 25% lower than in Western Europe in general. The regularity of the figures (see Table 23) is most striking.

The mortality, according to age, for Sweden, can be studied from the year 1750. A summary of the results of such an examination is given in Table 24 (next page).

The decline of mortality bears with it an increase in the length of life. According to the Swedish tables of mortality, the **Expectation of life** for a new-born child is, in this country:

Years.	Both sexes.	Men.	Women.
1755/1775	35·20 years.	33·90 years.	36·60 years.
1816/1840	41·43 »	39·50 »	43·56 »
1861/1870	44·58 »	42·80 »	46·37 »
1881/1890	50·02 »	48·55 »	51·47 »

The average length of life has thus increased during the last century and a half, from 35 to 50 years. This fact alone is sufficient to show the complete revolution affected during the 19th century in almost every condition of life. The mean lifetime is now in Sweden 50·02 years, in Norway 49·94, in Denmark 47·85, in England 45·43, in Belgium 45·06, in the Netherlands 43·75, in Finland 42·80 years. In France, the average length of life was 42·13 years for the period 1877/81; and at the present time it is probably somewhat higher. The figure 50·02 for Sweden is the highest figure a whole nation has ever reached. — In the *country districts* of Sweden, the average length of life reaches 51·58 years but in the towns only about 43·38. The average length of life for the men is 48·55 years (in the country districts 50·55 and in the towns only 40·05), for the women 51·47 years (in the country districts 52·62 and in the towns 46·41).

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TABLE 24. *Death-rates in Sweden. By ages. Yearly, ‰, 1751/1895.*

Age.	1751—1775.	1776—1800.	1801—1825.	1826—1850.	1851—1875.	1876—1895.	1886—1895.	1773[3]. (Max.)	1895[4]. (Min.)
0/1 years[1]	210·83	196·74	183·86	162·82	140·53	112·05	103·90	285·85	94·69
1/3 » [2]	55·28	52·66	47·51	34·66	36·86	29·41	24·94	117·32	19·84
3/5 »	28·60	25·92	19·62	15·57	19·70	15·66	13·03	74·52	9·85
0/5 » [2]	87·24	81·62	73·78	59·67	57·29	44·52	39·15	136·74	33·88
5/10 »	14·18	12·08	10·04	7·74	9·26	7·99	6·65	44·94	5·45
10/15 »	7·53	6·27	6·00	4·53	4·63	4·08	3·71	24·90	3·34
15/20 »	7·26	6·42	6·42	4·92	4·90	4·57	4·56	18·85	4·43
20/25 »	8·76	8·00	8·42	6·91	6·52	6·01	6·06	19·68	6·15
25/30 »	10·38	9·56	9·28	8·23	7·28	6·45	6·33	21·28	6·01
30/35 »	12·53	11·07	10·78	10·17	8·36	6·85	6·64	24·78	6·17
35/45 »	14·84	13·25	14·06	13·60	10·72	8·23	7·95	29·63	7·37
45/55 »	21·35	18·70	20·99	19·98	15·79	11·56	11·07	45·11	10·21
55/65 »	35·12	32·81	37·75	34·43	29·19	21·12	20·38	71·05	18·50
65/75 »	70·35	74·65	76·13	73·76	63·10	47·67	46·28	130·12	42·70
75/ω »	168·64	169·72	181·97	176·17	155·32	135·30	132·21	244·26	121·94
Total	**28·71**	**26·22**	**25·83**	**22·27**	**20·32**	**17·17**	**16·49**	**52·65**	**15·19**

A few *details* may here be copied from the copious figures of Swedish mortality statistics.

In the **country-districts,** the mortality has sunk, if we compare the periods 1816/40 and 1891/95, from 22·26 ‰ to 16·27 ‰: for the *towns* the decrease has been from 34·44 ‰ to 18·05 ‰. The figures for the towns were then, during the former period, 55 % higher than those for the country-districts, but during the latter period, only 11 % — a telling witness of the improved sanitary conditions and communal administration in general of our towns. The higher figures, which still distinguish the towns from the country-districts, are due almost entirely to the higher death-rate amongst children of tender years — especially those of illegitimate birth — and amongst middle-aged men. Among married women also the death-rate is somewhat higher in the towns.

For the years 1891/95, the mortality in the **first year of life** amounted to 102·8 per thousand of living-born children (in the first month of life, 34·8; the first week 16·0; the first day 6·0). For country-districts the figures are 95·8 ‰; for towns, 131·3; for the län of Vermland, but 76 ‰; for that of Jönköping, 77; for Örebro and Skaraborg, 80·0 ‰. The figures were highest for the län of Vesternorrland and the town of Stockholm, with 141 ‰ and 170 ‰ respectively. The average figure for Western Europe is about 180 ‰. The mortality amongst legitimate children in Sweden for the years mentioned was 95·1 ‰; amongst illegitimate children, 168·0 ‰.

Deaths by violence (not including suicides) amounted annually to about 640 per million of the population during the period 1821/40; this figure sank to 448 for the decade 1881/90. The number of those drowned, especially, has sunk from 361 to 240; all the other cases have decreased from about 280 to 208 — all per million inhabitants.

During the period 1881/90, the various **months** of the year showed the following death-rates per annum, in ‰: January 19·93, February 18·95, March 19·55, April 19·12, May 18·13, June 15·90, July 14·48, August 13·47, Sep-

[1] Per 1,000 live births. — [2] Per 1,000 of mean population. — [3] Famine. — [4] Later, the year 1898 has attained a yet more favourable result, or only 15·08 ‰ for the whole population.

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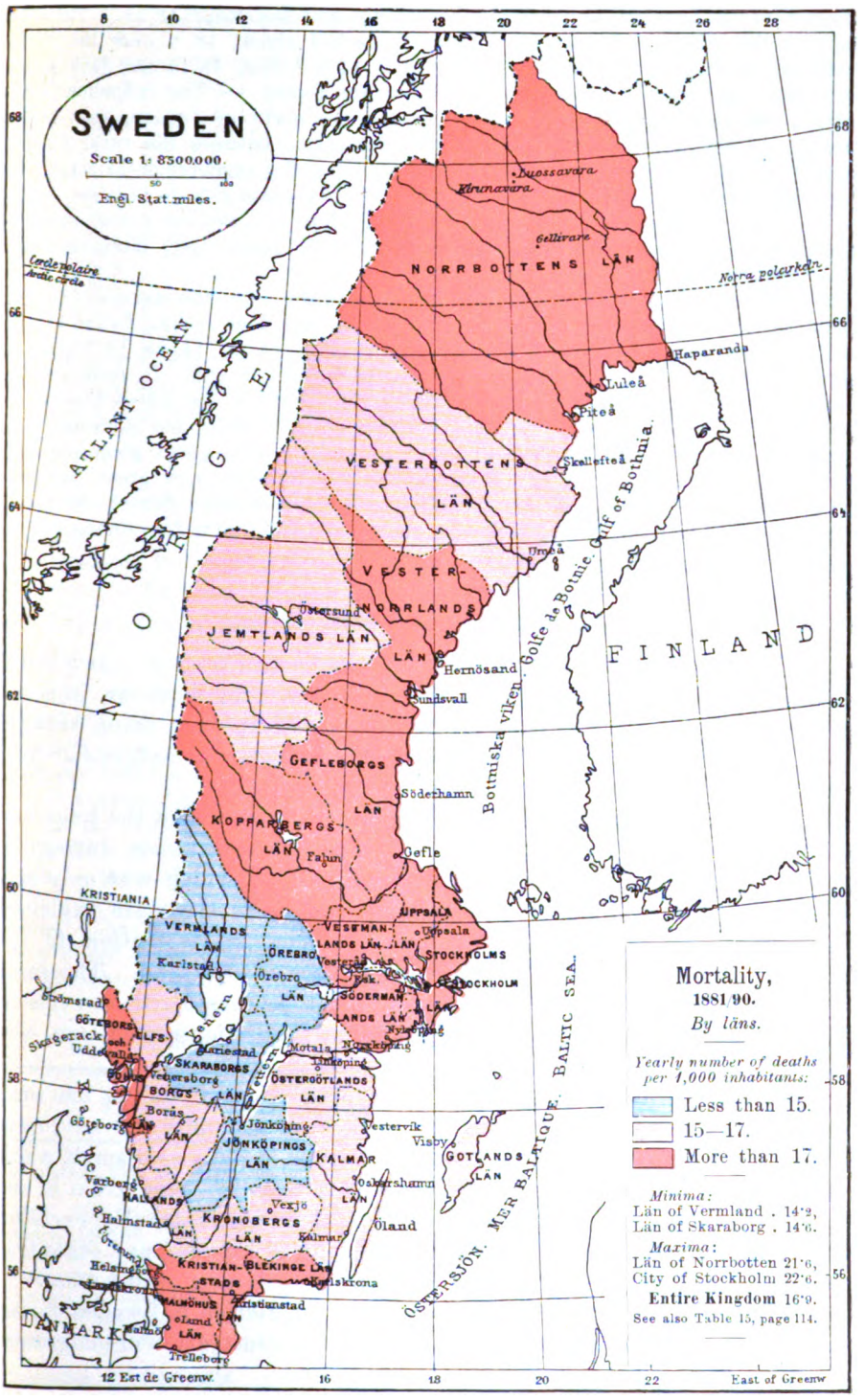

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tember 13·41, October 15·04, November 16·82, and December 18·58. The average for the year was 16·94. Thus January reached almost 18 % *over* the yearly average, but September, on the contrary, fell 11 % *below*. In former days, spring was the most dangerous time, now it is rather winter. — The influence of the season on mortality is considerably less in the north of Sweden, than in the south — just contrary to what we would expect. Between the rural districts and the cities, the difference is greatest during the summermonths, especially for the masculine sex. In the highest ages, the death-rate is greatest during winter; in the middle ages, during spring. For the earliest years, winter is generally the most disastrous, but at times also midsummer; more especially was this the case formerly and in towns.

The mortality in the different **läns** of Sweden, for the decade 1881/'90, may be seen by the map on page 127. In the läns about Lakes Vettern and Venern, the mortality now amounts to only about 14 to 15 ‰, — a figure which is really a most extraordinarily favourable one. In former times, mortality was lowest in the län of Jemtland (for 1841/50, but 12·95 ‰ — probably a world-record) but of late years the mortality there has increased as a result of the development of the timber-trade and the consequent great immigration. The mortality in the city of Stockholm was formerly very great, but nowadays the figures are, on the contrary, very favourable. During the period 1896/1900, the mortality in Stockholm amounted to but 18·2 ‰, or less than in most of the other European capitals.

Immigration and emigration.

The modern emigration movement can be said to date — as a whole — from the decade beginning 1840. In Sweden, however, it began somewhat later, the Swedish *emigration-periods* proper being between the years 1868/73 and between 1879/93. At present, emigration from this country is again at a low tide.

It has already been shown, in the chapter dealing with the frequency of marriage, how the great stream of Swedish emigration during the periods named above (the relative greatness of which was only surpassed by that of Norway and Ireland) can be in the main explained by the unfavourable conditions under which the transition to the modern system of industrial life took place in our land. The great decline of emigration, of late years, must be considered as evidence that the difficulties of this unfavourable transition-period are now in way to be surmounted.

That emigration assumed the great proportions it did at one time, is also to be ascribed to that inborn love of roaming and adventure which our people share with the other Germanic races — a spirit which is unusually developed amongst us. And a Swedish population of one million souls having established itself in America, naturally exercises such a great power of attraction, on account of kin-ship and other ties, that we can hardly suppose that emigration will ever quite cease.

A general survey of the movement of population in Sweden during the period 1851/95, with a special view to the illustration of emigration and immigration, is given in Table 25.

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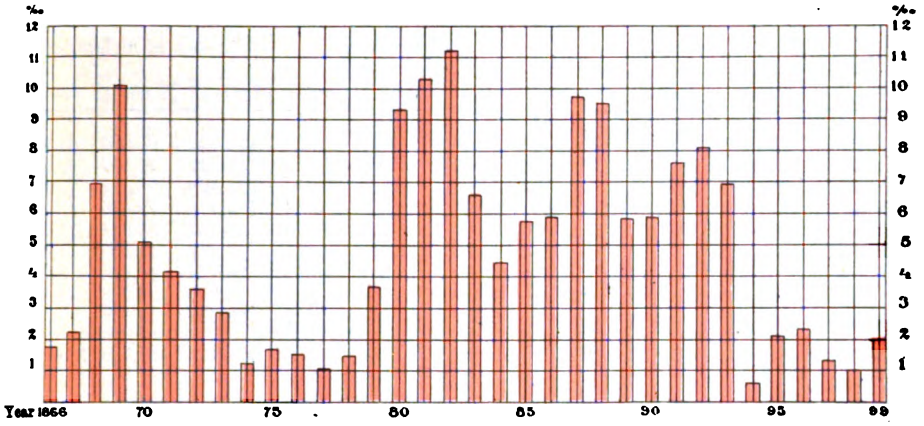
Net emigration per 1,000 inhabitants, 1866/99.



Then we see that, during these forty-five years, about 916,000 persons in all have emigrated from Sweden, of which number but 125,000 have been replaced by immigration or by the return of emigrants — a common occurrence. The net amount of emigration is thus nearly 800,000 persons; of a truth, a most material loss for a people counting but five millions.

Table 26 shows that this loss includes 462,000 persons of the male sex and but 329,000 of the female sex. The disproportion between the sexes is most unfavourable, just at the age which is here of most importance. We have lost, of persons between the ages of 20/25, no less than 156,000 men, and but 80,000 women; a proportion of 195 to 100.

On the whole, the loss of those in the age of childhood has amounted to 132,000, whilst within the group of the most able-bodied — 15/35 years of age — the loss is no less than 563,000. There are 68,000 in the group 35/50 years, and, in the whole group above 50 years of age, only 27,000 persons. The net loss of *married* people is 125,000; of *unmarried adults* (above fifteen years of age) 533,000, the men numbering 329,000 and the women only 204,000.

TABLE 25. *Movement of population in Sweden, 1851/95.*

Factors of the movement.	Total.	Men.	Women.
Population, Dec. 31, 1850	**3,482,541**	**1,687,248**	**1,795,293**
Births, 1851/95	**5,833,827**	2,990,468	2,843,359
Deaths, 1851/95	**3,606,720**	1,826,728	1,779,992
Excess of births	**2,227,107**	1,163,740	1,063,367
Emigrants, 1851/95	**915,352**	535,876	379,676
Immigrants, 1851/95	**125,164**	74,148	51,016
Excess of emigrants	**790,388**	461,728	328,660
Increase of population	**1,436,719**	702,012	734,707
Population, Dec. 31, 1895	**4,919,260**	**2,389,260**	**2,530,000**

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TABLE 26. *Total emigration and immigration, 1851/95.*[1]

Ages.	Emigrants.			Immigrants.			Excess of emigration.		
	Total.	Men.	Women.	Total.	Men.	Women.	Total.	Men.	Women.
0/15.....	**154,487**	78,201	76,286	**22,060**	11,121	10,939	**132,427**	67,080	65,347
15/20.....	**150,872**	81,413	69,459	**8,039**	3,856	4,183	**142,833**	77,557	65,276
20/25.....	**258,713**	168,828	89,885	**23,204**	13,254	9,950	**235,509**	155,574	79,935
25/30.....	**151,405**	94,747	56,658	**25,327**	15,271	10,056	**126,078**	79,476	46,602
30/35.....	**77,457**	45,799	31,658	**18,564**	11,885	6,679	**58,893**	33,914	24,979
35/40.....	**44,535**	26,123	18,412	**11,006**	7,391	3,615	**33,529**	18,732	14,797
40/45.....	**26,428**	15,085	11,343	**6,306**	4,440	1,866	**20,122**	10,645	9,477
45/50.....	**18,319**	10,030	8,289	**4,049**	2,748	1,301	**14,270**	7,282	6,988
50/ω	**33,336**	15,650	17,686	**6,609**	4,182	2,427	**26,727**	11,468	15,259
Total	**915,552**	**535,876**	**379,676**	**125,164**	**74,148**	**51,016**	**790,388**	**461,728**	**328,660**
Of these:									
Children[2]	**154,487**	78,201	76,286	**22,060**	11,121	10,939	**132,427**	67,080	65,347
Married .	**156,764**	83,808	72,956	**31,704**	18,240	13,464	**125,060**	65,568	59,492
Single[3]..	**604,301**	373,867	230,434	**71,400**	44,787	26,613	**532,901**	329,080	203,821

On the whole, the emigration has risen above the average frequency, for the whole population, only in the ages 15/35. The consequence of this will be that the growth of these age-groups is slower than that of the rest of the population — even if they do not actually diminish — and that their numerical importance becomes smaller in proportion to the total population. A natural consequence of this, again, is a relative diminution also in the number of births, so that the group 0/5 years also belongs to the list of those whose relative numbers are declining. The age-groups 5/15 and 35/ω are more favoured, especially the age-group 50/ω. The effect of all this upon the composition of the population according to age, is shown plainly by Table 13, page 112.

During the period 1851/95, about 768,000 persons have betaken themselves to transoceanic lands, by far the greatest proportion of whom have emigrated to the United States of America[4], whilst 148,000 persons have sought homes in European countries. Of the latter number of emigrants 48,000 have gone to Norway; 63,000 to Denmark; 12,000 to Finland and Russia; 20,000 to Germany, and but 5,000 to other European countries. The annual number of emigrants to the neighbouring lands is almost constantly about 5,000 persons; of those who go to Norway and Denmark there return about 50 %. The immigration from Finland is even greater than the emigration thither. But only 6 % emigrant Swedes have returned from the United States, though the per cent has risen during the last few years; thus, in 1894/99 a total of 69,870 Swedes emigrated to the United States, while 31,027 persons immigrated from the United States to Sweden.

[1] With approximate additions for unreported emigration and immigration. For 88,073 emigrants and 20,861 immigrants the distribution according to age and civil conditions is approximative. — [2] Below 15 years of age. — [3] Widows and widowers included. — [4] It may here be remarked that when, of late years, the number of Swedish immigrants to America has been stated at a higher figure than is warranted by Swedish statistics respecting emigration, this is accounted for by the fact that the higher figures include a great number of emigrants from Finland, who pass through Sweden.

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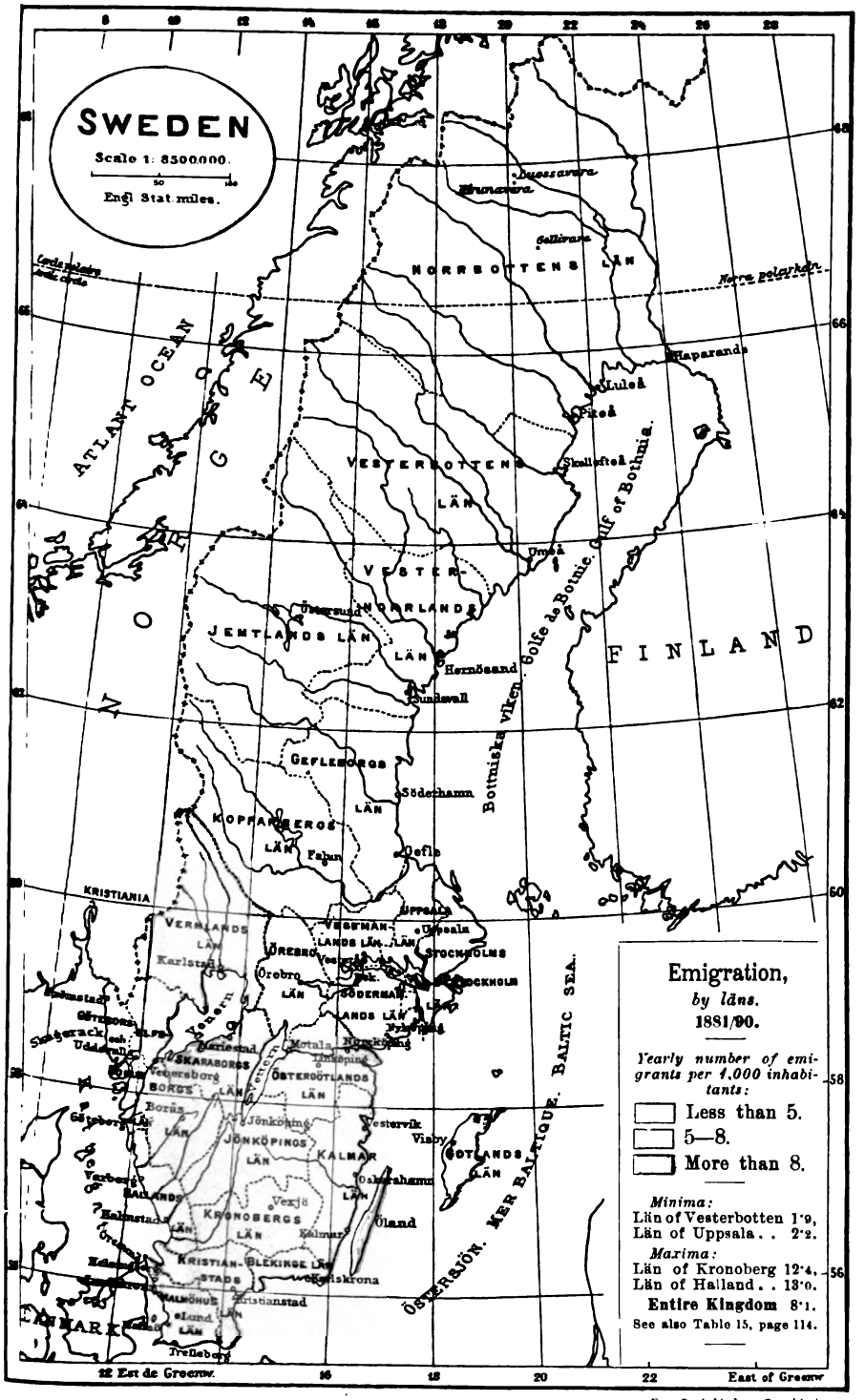

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The Swedish-born population in the *United States* entered in the census of 1900 was 574,625 persons; counting the immigrants since that time and also children born in America of Swedish parents, the total Swedish population might be at least 1 million, perhaps considerably more. The great bulk is to be found in the States of Minnesota (more than 20 per cent), Illinois, Iowa, and other states around the great Canadian lakes, as well as in South Dakota etc., — the climate of which somewhat resembles that of Sweden. Especially in Minnesota there are vast regions wholly populated by Swedes. The Swedish immigrants have to a greater proportion than those of most other nations occupied themselves in farming, then in industry and navigation, only few of them in commerce. Though the Swedes still have great affection for their old country, they generally, soon, become very good Americans.

The emigrants from Sweden consist, for the most part, of workmen (agricultural and industrial) and domestics, but, of course, all classes of society have their representatives. The emigration, on a large scale, of unmarried women began a little later than did that of the other classes, but that, too, soon reached important dimensions.

Emigration from the flourishing North Sweden, the inhabitants of which are to a great extent dependent on the timber-trade, has always been considerably lower than from the agricultural provinces of South Sweden.

The **effects** of this great emigration have undoubtedly extended to all classes of society. From an economic point of view, emigration proved a relief during the period when the younger age groups were in excess, and when the opportunities for work were few, as was the case, for instance, about 1880. But, at other periods, the loss of such an amount of working-power must have been crippling, and it cannot be advantageous to the economy of any country to bring up and educate young people who immediately afterwards proceed to utilize their training in a foreign land. Neither is it possible for the productions of a country to increase to any great degree, unless there be a simultaneous increase in the number of the consuming population. And if we leave the economical point of view for that of culture, we see that emigration has occasioned Sweden a most sensible loss, in carrying away a large proportion of the most intelligent and capable part of the population.

On the other hand, our country has already derived no small gain from the profitable intercourse with other nations — especially with the great republic on the other side of the Atlantic — to which emigration has given rise, and from which powerful impulses for good have already made themselves felt in the life of our country. Neither can it be said to be of no importance for our nation that, poor both in wealth and number as it relatively is, it thus shares in the work of building up one of the great powers of the world, a country where many a gifted Swede finds the *ample field of activity* which the restricted conditions of his own land do not provide him with at home.

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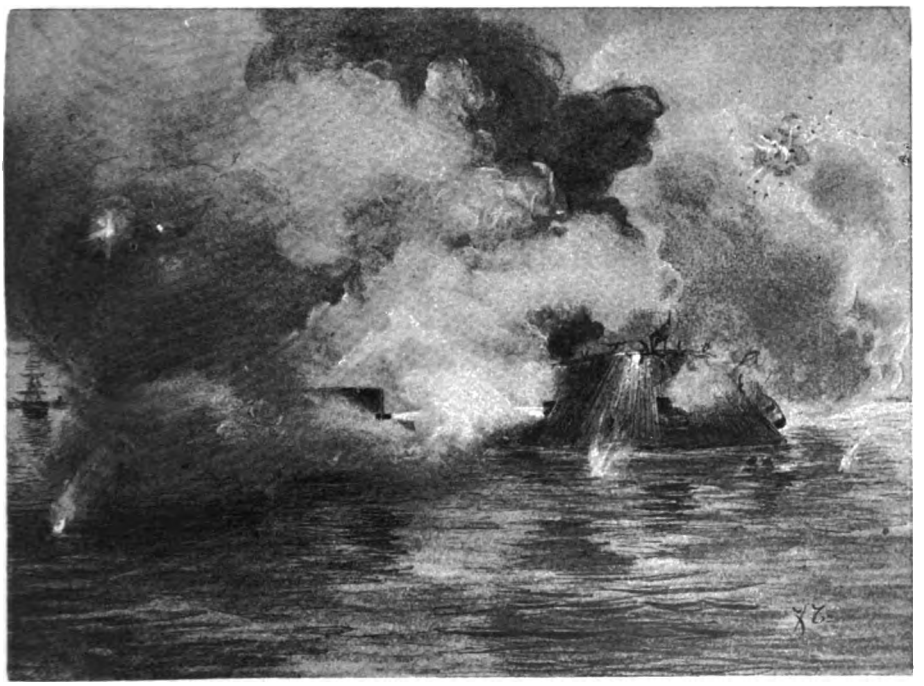
For America, the Swedish part of her population will unquestionably be of great worth. It is true that the larger number of emigrants from Sweden are labourers, nearly all without great means, and under such circumstances it can easily be understood that, *as yet*, they cannot hope to play any great rôle in the intellectual life of their new country. But the cultural work which has been so consequently carried on in Sweden for many centuries must, in every case, form a most valuable basis for the future. And what other country has sent to America settlers whose families have, *for several generations*, enjoyed a general book education? And the best features of the Swedish national character — industriousness, simplicity, obedience to law, integrity, and chivalrousness — have, too, won due acknowledgment in America, and must always form a valuable contribution to that formation of a national character, which is now taking place. The peculiarly well-developed bent of Swedish people for the study of natural science and for mechanical inventions has already won well-deserved triumphs in America; we need but recall the names of John Ericsson and of J. A. Dahlgren — to say nothing of a great many others.



Fight between the Monitor of John Ericsson and the Merrimac in Hampton Roads. March 9, 1862.

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3. NATIONAL CHARACTERISTICS. MORAL AND SOCIAL CONDITIONS.

The Swedish race is of Teutonic origin without foreign intermixture, and the *external appearance* of the people testifies to the fact. They are, as a rule, tall and well-grown; they have light hair, broad and lofty foreheads, and blue or grey eyes. The formation of the skull is dolichocephalic — though brachycephalic skulls also occur — and orthognathous.

The Swedes are one of the *tallest* nations on the earth. Indeed it is possible that they rank second to none of the civilized peoples in this particular. The most recent statistics show that the average height of a male Swede between the ages of 30 and 35 is 170·8 centimeters.

According to the extensive researches undertaken during these last years, the Swedish people seems to be the purest remainder now extant of the old Teutonic race, and anthropologically it shows a remarkable homogeneity. Considering the **shape of the head,** the investigations mentioned have made manifest that in Sweden a high degree of *dolichocephalousness* is prominent: the average number of cranium index is 75·9, the variation in the different provinces being only between 74·8 in Södermanland and 77·5 in Lappland.* Upon the whole, 87 % of the population of Sweden can be considered as dolichocephalous and only 13 % as brachycephalous; how the latter numbers vary in different parts of the country will be seen by the map on page 135.

As regards **colour of the hair** and **colour of the eyes,** the researches above mentioned have proved that 75·3 % of the population of Sweden have light, 22·4 % dark (brown), and 2·3 % red hair; light (blue or grey) eyes are to be found in 66·7 %, brown ones only in 4·5 %, and eyes of mixed colours in 28·8 %. When considering the matter at large you will find the light colours of the hair and of the eyes predominant and most strongly marked in those parts of the country where a pronounced dolichocephalousness prevails.

It is an interesting circumstance that the statistics collected in connection with compulsory military service prove incontestably that there has been a considerable increase in the **average height** of the population of Sweden during the last half-century. The average height of a conscript accepted for military service of the age of twenty years, works out for the five-year periods 1841/45 to 1866/70 and 1891/95 in order at: 167·0, 167·1, 167·5, 167·7, 168·2, 169·3 and 170·1 centimeters; that is to say, there is no less than 3 centimeters' increase. — The variations in height in different parts of the country may be seen by the chart on page 136. The greatest average height is attained by the inhabitants of South Norrland and of the towns of Stockholm and Gothenburg. The investigations undertaken by A. KEY show that the average height of pupils at the Swedish public colleges ranges *higher* than that of the population at large at the same ages. Both in regard to height and to weight Key's figures, it may be noted, give a very favourable result when compared with data collected for other countries, and that holds good not only about boys but also of girls.

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* By *cranium index* is understood the ratio between the length and the breadth of the cranium; where the breadth is less than 80 per cent of the length, the shape of the cranium is said to be dolichocephalous, otherwise it is brachycephalous. The general average numbers are calculated by the Swedish naturalist A. RETZIUS, inventor of this classification, to be: for dolichocephalous 75 per cent and for brachycephalous 83 per cent.

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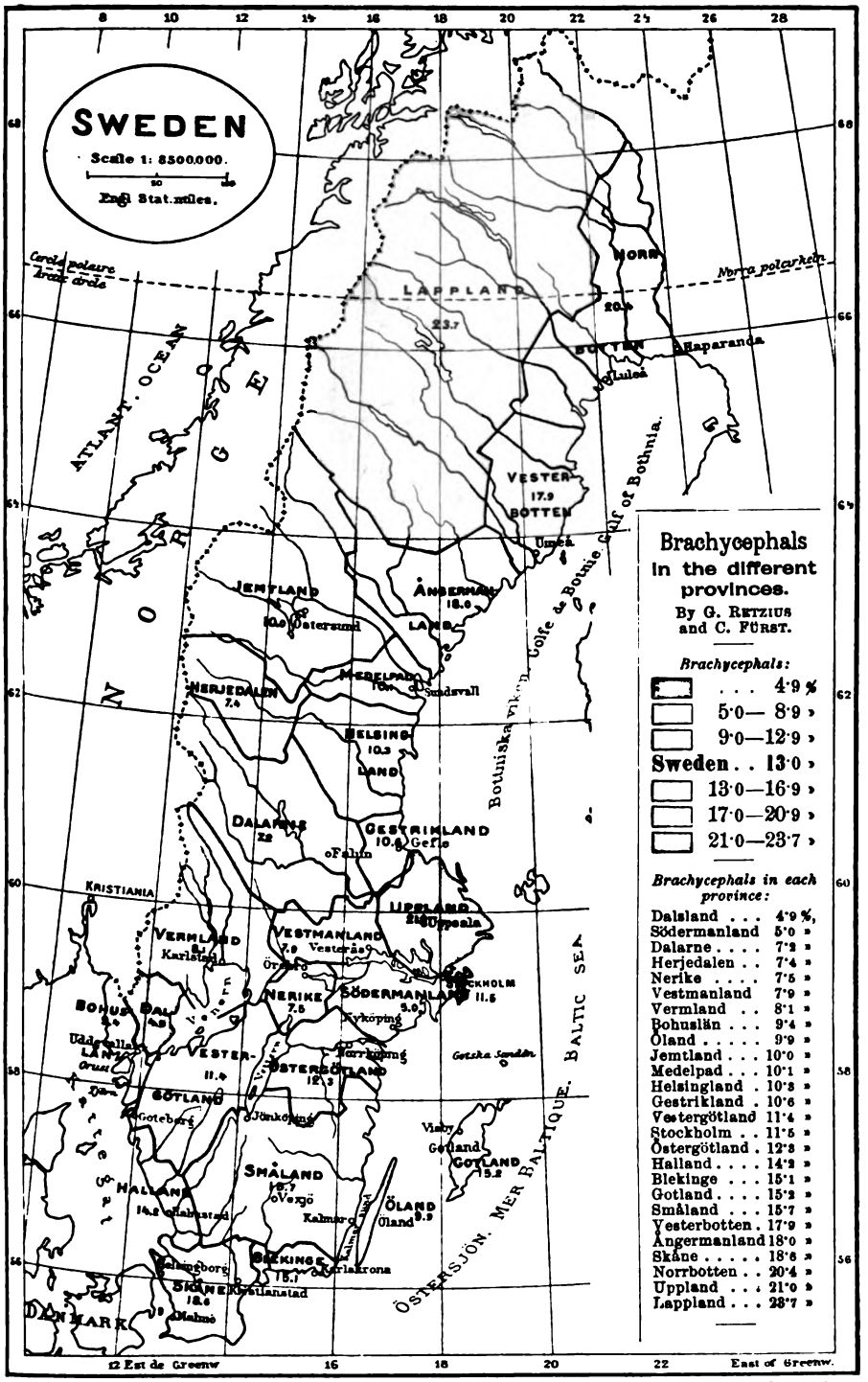

Brachycephals in the different provinces.

By G. RETZIUS and C. FÜRST.

Brachycephals:

	. . . 4·9 %
	5·0— 8·9 »
	9·0—12·9 »
	Sweden . . 13·0 »
	13·0—16·9 »
	17·0—20·9 »
	21·0—23·7 »

Brachycephals in each province:

Dalsland . . .	4·9 %,
Södermanland	5·0 »
Dalarne	7·2 »
Herjedalen . .	7·4 »
Nerike	7·5 »
Vestmanland	7·9 »
Vermland . .	8·1 »
Bohuslän . . .	9·4 »
Öland	9·9 »
Jemtland . . .	10·0 »
Medelpad . . .	10·1 »
Helsingland .	10·3 »
Gestrikland .	10·6 »
Vestergötland	11·4 »
Stockholm . .	11·5 »
Östergötland .	12·3 »
Halland	14·2 »
Blekinge . . .	15·1 »
Gotland	15·2 »
Småland . . .	15·7 »
Vesterbotten .	17·9 »
Angermanland	18·0 »
Skåne	18·6 »
Norrbotten . .	20·4 »
Uppland . . .	21·0 »
Lappland . . .	23·7 »

Gen. Stab Lit Anst. Stockholm.

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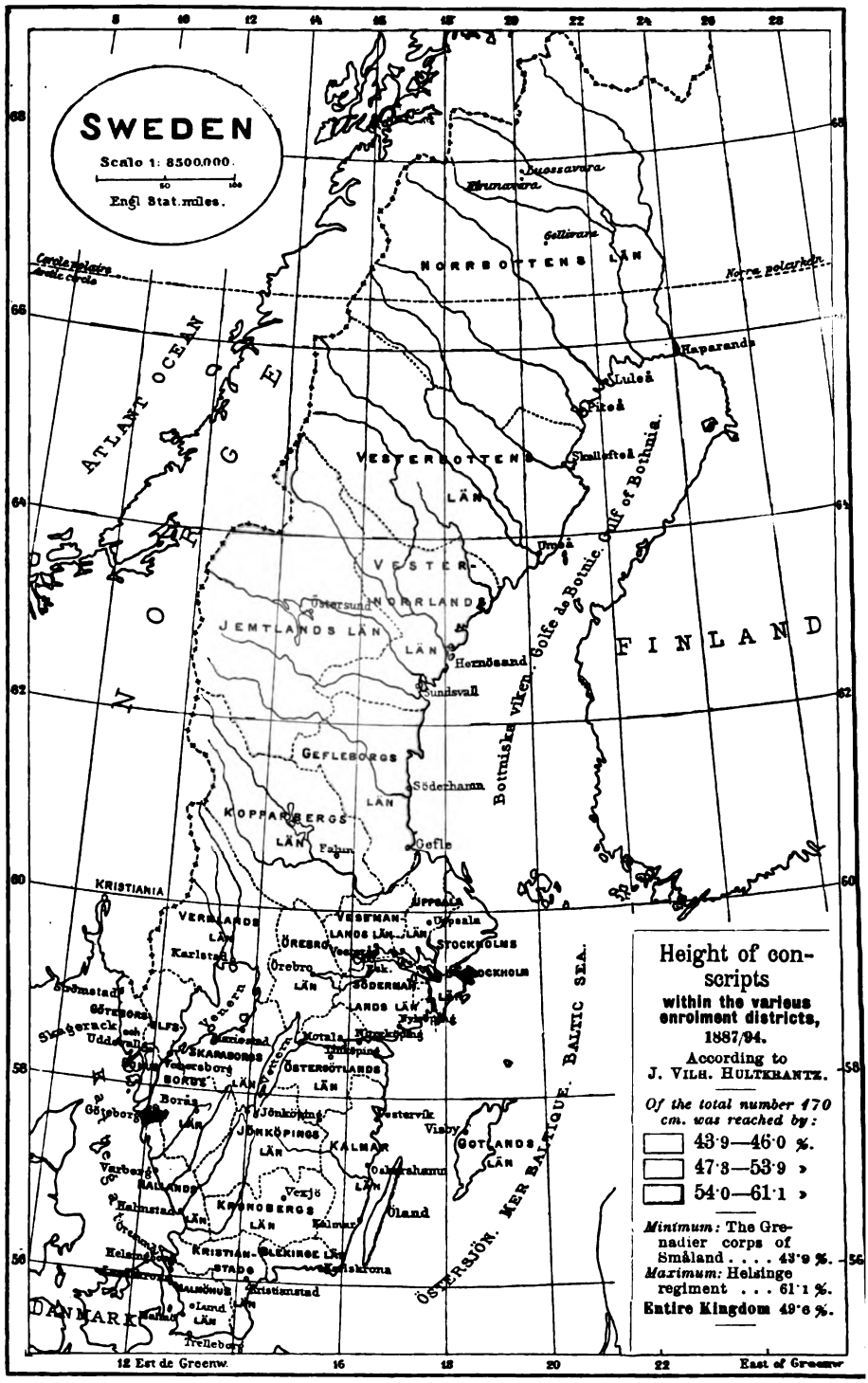

Gen. Stab. Lit. Anst. Stockholm

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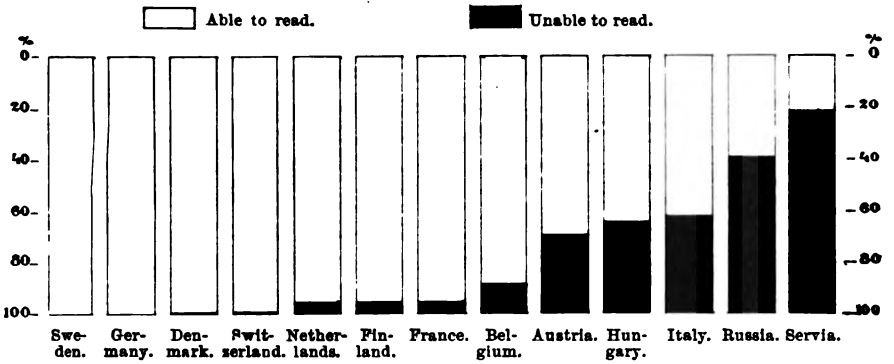
Percentage of illiteracy among the conscripts.



The figures given above with reference to the height of conscripts plainly denote that physical development has *improved* among Swedes during the period given. The figures for those who have been rejected as **unfit for military service** tell in the same direction. The percentage of these to the whole, for the six decades 1831/40 to 1881/90 and for the period 1891/95 in order are: 35·7, 36·4, 35·7, 27·8, 23·6, 20·2, and 21·7; that is to say, a considerable improvement on the whole. Compared with the figures in other countries, the percentage of rejections is unusually low. Here, too, may be remembered the fortunate position which Sweden occupies in regard to mortality, and the very marked way in which the death-rate has declined, especially during recent decenniums.

With regard to the *Dissemination of Knowledge among the People* it will probably be a well-known fact that the Scandinavian nations occupy a very prominent position. The art of reading has been general in Sweden *for many generations*; and hence a certain degree of intellectual power has been attained by the people at large, forming a very sound foundation for further educational improvement. On the other hand, it may be that there is at times wanting that youthful enthusiasm for the acquirement of knowledge often met with in nations where the great masses have only recently begun to enjoy the advantages of book-learning.

Hence, it will be observed that, for many generations, the population of Sweden, by the power of being able to read, has been placed in a position to pursue mental work. In contrast to this favourable condition of things, it is to be remembered that the extensive area of the country, the sparseness of the population, and in many parts their poverty too, do not let life itself present to the people as many opportunities for mental improvement as in more wealthy and more thickly populated countries. A result of this is that the intellectual development of the Swedes often appears to be unequal in character and not to come into full force in practical life. A certain coarseness of mind is, moreover, still to be found in many places as remains from the incessant wars of bygone ages — or, may be, in part from the early nineteenth century, when drunkenness was very widespread.

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Those qualities which go to make an able *warrior* have always been very prominently present in Swedes, and it may safely be affirmed, without danger of overstepping the bounds of truth, that the history of Sweden's wars is one of great brilliance, which few other nations can equal. That in spite of the eighty years of peace which the country has now enjoyed, its inhabitants are still imbued with the same instincts and virtues in this direction, is abundantly manifest. Scarcely a war is waged in any part of the world, even in our own times, but that a considerable number of Swedes volunteer of their own accord for service, and seldom does it happen that these warriors do not do credit to the national tradition for valour in arms.

Let the opinions as to war be what they will; it cannot be denied that war entails a very great output of energy, and that every people in this situation clearly bears witness of its real character. As regards the Swedish people, it may be said that, when put to this trying ordeal, they display very manifestly the more open, bright and, so to say, *luminous* sides of their nature, such as: intrepid courage, persistent bravery, disinterested self-sacrifice, and noble chivalry — all qualities to excel and triumph preeminently on the actual field of battle. Foreign to the Swedish temperament, on the other hand, is that dark fanaticism, that induces the citizens of a Numantia or a Zaragossa to bury themselves beneath the ruins of their homes. Similarly, dismal hatred is not cherished by a Swede; towards a conquered foe he is ever merciful and ready to conciliate him; indeed it not seldom occurs that this phase is exaggerated to the detriment of his own real interests.

What has just been said proves indisputably that a pronounced *humanity* is a main feature of the Swedish temper. The way in which Swedes have treated other nations with whom they have come into contact in the past, bears unimpeachable testimony to this fact.

History has not many — perhaps indeed no — instances to present that bear comparison with Sweden's treatment of conquered Finland; how the former moulded the latter into a sister people, with the grant of a full share in the civilization to which she had herself attained; how the superior race literally *educated* the inferior, in just the same manner as in private life the elders educate their juniors, but in a manner that is *not* by any means regularly adopted between nations. Wherever, moreover, Swedish rule has in the past prevailed, as for instance in the Baltic Provinces, in Pomerania, and in other places, the memory of it still lives as a righteous and humane rule, a rule which never sought to *subdue* others in its own interests, but rather to elevate and to raise them as far as possible. A characteristic example of this is afforded by the only colony that Swedes have founded in foreign parts, viz.: the so-called New Sweden, in the present State of Delaware. Alone of all European nations, the Swedes succeeded in living in complete peace with the aboriginal Indians, being inspired in all their dealings with them by sentiments of justice and humanity; wherefore the colonists in New Sweden have been ever styled by the Indians: »Our White *Brothers*».

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At home, also, Swedes readily practise this noble uprightness of dealing, which forms one of the securest foundations for the social fabric, often compensating for short-comings in other directions. Obliviousness to the above circumstance often causes critics to form a less favourable opinion of the social condition of Sweden, both in ancient and modern times, than it deserves.

Another evidence of that humanity as a trait of Swedish character may be seen in the pronounced dislike felt by Swedes for every species of *headstrong behaviour*. The attempt to assert own legal rights to the infringement of the just and well-founded claims of others, meets with less sympathy in Sweden perhaps than anywhere else.

The *Power of Organization* in a highly developed degree is another characteristic feature of the Swedish nation, and the solidity and stability that the fabric of Swedish society has displayed through the past centuries, are doubtless in large measure due thereto. To this is allied a great faculty for subordination under others without loss of personal dignity, and an equally marked faculty for ordering others without arrogance or bullying. At the present day there are to be found in many parts of the world young Swedish engineers occupying posts where they have hundreds and even thousands of workmen under them, and discharging their duties with that quiet courtesy, that strength combined with justice, which render obedience a matter of course and not of compulsion, and which result not only in the best possible relations between superiors and subordinates, but also in the greatest and most efficient output of work.

The great importance that Swedes attach to politeness and consideration for others in *human intercourse*, is well known, as is also their hospitality. On great occasions show and pomp are in evidence among them, and rhetoric is in danger of being over-estimated. A weakness for theatrical effect on their part cannot be wholly denied, though it is relegated to occasions of no great importance and is only existent in externals. That the Swedish people are capable of humble observation of duty, of unmurmuring self-denial, and of heroic self-sacrifice when the call arises, the whole of their history amply proves.

The characteristic of the Swedish nation that is most deeply rooted, and that forms the key, as it were, to the whole, is their intense *love of Nature*. This is it that has given birth to the great Swedish naturalists, to the Swedish inventors, and to the Swedish explorers; to the same source are to be traced the Swedish lyric poets, the magnificent Swedish national melodies and singing, and the special course that Swedish *imaginativeness* has taken. This preeminent appreciation of the charms of Nature has, however, diverted the attention of Swedes to some degree *from* psychological fields, and hence a Swede, while often, or almost always, a great nature-lover, is seldom strong as a student of mankind — a consequence of this being, amongst other things, that there is an abundant lyrical literature but a very scanty dramatic one.

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The love of Nature arises spontaneously in the breast of a Swede by reason of the country in which he dwells being specially calculated to prompt it. Nature as seen in Sweden is not, generally speaking, majestically imposing as in Norway, but neither is it at times repellent or overpowering as there, nor yet enervating as is often the case in more luxuriantly foliaged countries, nor forbidding as are deserts and steppes; in its peculiar conjunction of freshness and idyllic charm, it is *inviting* in that word's most literal sense. The appreciation of Nature is equally widespread among poor and wealthy, though the former may not be equally conscious of it. This feature of Swedish character, strong attachment to Nature, may at times occasion mental manifestations of license and coarseness, but it forms, on the other hand, the main source and explanation of the indestructible health and strength enjoyed by the Swedish nation, which have so many times been in evidence when the nation has passed through the most trying ordeals, and have even defied the ravages on physical and mental forces entailed by that easy-going thoughtlessness which Swedes are not unfrequently guilty of falling into. A happy-go-lucky *way of letting things slide* is, indeed, the most serious weakness of the Swedish character. On the other hand, it may be pointed out that history often enables us to observe a more vigorous vitality present in a nation with those characteristics, than in one prone to spend its endeavours solely upon collecting and preserving, whereby it becomes sapless and parched.

The realm of Sweden is the most ancient of those now existing in Europe; the records of history give us no instance of a foreign yoke ever having been borne by the Swedes; thanks also to the remoteness of the country from the central parts of Europe, it has been able to preserve its social development rather free from foreign innovations. In Sweden there has never existed either hereditary feudal system, or bondage of the lower classes; on Swedish legislation Roman Law has had but little influence, while the Roman Church has exercised less power in the country of Sweden than in perhaps any other on the continent of Europe; moreover, the people have been subjected to an absolute monarchy as a form of government only for very brief periods. When it is remembered that Swedes have preserved the distinctive features of their Aryan origin with greater purity than any other of the Indo-European nations, it might be supposed that the special form that civilization has assumed in Sweden would have had a highly *original* stamp; at the same time, however, there is also the danger present that such isolation in development might result in general stagnation.

On closer acquaintance with the people of Sweden, we shall find that the views just enunciated admit of very considerable modification. As regards originality in the Swedish social fabric as such, it is undeniably present, though not in so marked a degree as might be expected, or is to be found beneath the surface rather than upon it. On the other hand, the stagnation that was to be feared from isolation is wholly non-existent — save, perchance, for a certain degree of conservatism in social life and ways, similar to that prevailing yet more pronouncedly in England.

That the isolation of Sweden just described has not borne all the fruits, whether good or evil, that might have been expected, is

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doubtless to be explained by the inherent *interest* felt by Swedes *for all things foreign*, a trait in their character that is intimately connected with their imaginativeness. This interest, that in all ages has rendered Swedes very apt to overvalue everything that has a foreign origin and to undervalue home products, has in many ways been fruitful of mischief for the people and has checked the natural development of national individuality. On the other hand, however, it cannot be doubted that it is this keen interest in all things human that has rescued the nation from becoming sterilized in cultural sense, and has warded off the perils that the isolation often touched upon might have otherwise involved.

Thus, the people of Sweden in our times presents the picture of a man who has certainly not attained to the utmost development of his best possibilities, but who has, on the whole, been able to maintain himself in that state of physical and mental soundness which gives the best surety of a long and prosperous future.

Social conditions.

The history of Sweden as a *social community* presents features of great interest, inasmuch as it is the record of an evolution upon an exclusively Teutonic basis, unaffected by the spirit of Roman culture or the theories of Roman equity that laid so evident an impress on the continent of Europe at large.

The Swedish commonwealth in its earliest phase knew of no other distinction, in a legal sense, among its members than that of *thralls* (nearly all captives of war) and *freemen*. Yet, even at that time, there existed wealthy and powerful clans, whose influence was perpetuated from father to son — a germ, consequently, out of which a nobility might emerge. Subsequent to the introduction of Christianity, yet another aristocracy arose in the shape of the Catholic priesthood, with its claims upon a legally sanctioned status of its own. During the progress of the 13th century the social fabric became moulded in set forms. The ancient condition of thraldom ceased to exist, though it was not till the beginning of the following century that it was legally abolished. The new *Estates*, on the other hand, were now recognized by law. The organization of the *Catholic Church* was brought to a definite conclusion by the Synod of Skeninge in 1248, and those employed in the service and ritual of the church formed, from that time forth, a special class of the community, that enjoyed a large share of privileges. Some forty years later, a legally acknowledged *temporal aristocracy* came into being, inasmuch as every man who engaged to equip himself to serve the realm as a horse-soldier, was declared exempt from the payment of all the general taxes. It was thus actually possible for any one who wished, and had sufficient means, to enter this class of the community, and an aristocracy of wealth, rather than of birth, was thereby constituted. The condition of things, however, peculiar to that age, rendered it a usual circumstance that people of high birth were well off, and, at large, the hereditary nobility may be said to have been instituted already now. At about the same period the *Cities* began to detach themselves as distinct communities, with legal institutions of their own.

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In the 14th century — a time of great unrest and frequently of general lawlessness — the aristocracy arrogated nearly all the power in the body social, and endeavoured to put into force, in Sweden too, the principles of feudalism. The Swedish *Peasantry*, however, averted this danger by rising in arms (1434), under the leadership of Engelbrekt, to oppose King Erik XIII. The vigorous national movement that succeeded this effort and lasted throughout the protracted Union wars with Denmark, raised the Swedish peasantry to a height of importance which that of no other country attained, not even of Switzerland, whose peasants fought, it is true, for their freedom, but did not exercise any influence on the political affairs of the country. In Sweden, however, during a period of over a hundred years (1434/1543), that may fitly be termed: »*The Peasants' Epoch of Greatness*», the peasantry, in conjunction with the patriotic section of the nobility, occupied the proud position of being in fact the ruling caste in the realm. As the *Swedish Diet* (Riksdag), was at this very time becoming established in more definite forms, it was a matter of course that the peasant class became a participating element in its constitution.

A check was given, it is true, by Gustavus Vasa, to the preponderance of the peasants, but their legal and social status was nevertheless secured for once and all. The reform in the Church organization carried out by Gustavus Vasa and the enforced forfeiture of the lands belonging to the Church, involved the *fall of the ecclesiastical aristocracy*. The new Protestant clergy came in, too, for its share of privileges, and became, in course of time, one of the four Estates into which the Riksdag was subdivided; its wealth and influence were, however, no longer what they once had been, and in succeeding centuries it always sided with the lower classes against the *nobility*.

The Estate of the Nobles, who, in the reign of the weak successors of Gustavus Vasa, were in 1569 expressly declared *to possess hereditary rights* — being thereby freed from the obligation of discharging military service as horse-soldiers — gained more and more influence during the wars of succession in the house of Vasa, and this finally attained to the height of its power during the great wars that shed a lustre on the land of Sweden in the 17th century. The »*Nobles' Epoch of Greatness*» had therewith set in, in its way no less remarkable than that of the peasants in the preceding age. The citation here of the names of Axel Oxenstierna, of world-wide renown, of the statesman Johan Gyllenstierna — foreseeing in so many respects — and of Per Brahe, the great re-creator of Finland, must suffice, but it may be added that nearly all the eminent and illustrious men that Sweden produced in that age belonged to the nobility. To some extent, however, that state of things was due to the numerous new men who were raised to the dignity of noblemen. Broadly speaking, it may be asserted that the titled aristocracy of Sweden have a finer record of achievements for their country than that of any other land, and not only are the instances of genuine desert very numerous but the acts of encroachment upon the rights and privileges of other classes of the community, are comparatively few in number.

The latter circumstance is not, however, to be understood as implying that the status thus attained by the nobility was not burdensome to the other Estates. More particularly did the immunity they continued to enjoy from the majority of the general taxes weigh heavily on the rest of the population, who were consequently constrained to pay all the more themselves. Most seriously threatened was the peasantry, being brought, as three centuries before, to the verge of social and financial ruin. On this occasion, they were rescued by the King and the Riksdag (in which assembly the Nobles were outvoted by the Clergy, the Burghers, and the Peasants). After a series of struggles, extending over more than thirty years (1650/82), Charles XI was at length enabled

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to pass a decree for the *forfeiture to the Crown* of the great majority of »*Crown Lands*», that had been given away or leased to the nobility, more especially by Queen Christina, and this »Reduction» was put into practice by the King on such a large scale that it forms a distinct epoch in the record of the possession of the soil of Sweden. The major part of the estates thus forfeited by the nobles, passed by purchase into the hands of peasant proprietors, and that class thereby attained so firm a standing, economically, that the effects of the same can be very plainly traced in Swedish political life of the present day. — With regard to the *nobility*, who, during their period of greatness, had split up into two markedly distinct groups — the higher and lower aristocracy — the forfeiture of their landed possessions left them as a class very numerous but very much impoverished, and they were fain, for the most part, to procure a livelihood by accepting posts in the public service.

This »grand forfeiture», that Charles XI effected, did not do away with the quarrels between the Estates in Sweden. In the 18th century they again broke out, the bone of contention now being the privileges enjoyed by the nobility, more especially their exclusive right to the higher government appointments and to the possession of untaxed land. (It is to be noted that the ancient immunity from certain taxes was now attached to the land as such). Once again a grand social reform was effected, this time, in 1789, by Gustavus III, who, by abolishing in large measure the above-mentioned privileges enjoyed by the nobility, secured the acquiescence of the other Estates to the inauguration of the (short-lived) reign of royal absolutism. The privileges that still remained to them after that process, the nobility voluntarily relinquished after the political revolution of 1809.

Thus, the Estates became leveled socially, though they survived as political units until the year 1865, when the time-honoured subdivision of the Riksdag into four bodies, representing the four Estates, was revoked, and a new, two-chamber system took its place. The members of these two chambers are elected by constituencies of qualified voters of all classes unitedly. A titled nobility still exists, it is true, but as a corporative body it is only concerned with the administration of certain funds, and since the above date, additions to its ranks have almost ceased. In 1892, moreover, the last relic of the ancient social status, the exemption from taxes, mentioned above as attaching to the possessors of certain descriptions of land, was also withdrawn. The rivalry between the Estates, that had prevailed for centuries, was thus brought to an end and a new epoch was inaugurated. Strife no longer prevails between »Estates» but between »Classes».

The aspect of affairs in the country of Sweden at the present day is in many ways unique. Since 1866 the class of *peasant proprietors* has had a *preponderating voice in politics*. In so far the present age might also be termed »The Peasants' Epoch of Greatness». Moreover it is to be noted as a special feature that the peasantry in Sweden bring a direct influence to bear on politics, and are not represented there by men chosen from other walks of life. The number of peasants who have seats in the Swedish Diet, is upwards of 100 — a state of things that has no parallel, save in Norway and Denmark; in neither of those countries, however, is the proportion so large. Of the labourers' class, though, the great majority are still without a political vote.* If, then, the Sweden of our times may be said to present, *politically*, the picture

* During the coming session, in 1902, of the Riksdag, the Government will bring in a bill on an extension of the franchise.

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of a state where both modern ultra-democratic and ancient aristocratic institutions and tendencies prevail, the latter are still, socially, in many cases preponderant. — Concerning the nobility — still surviving in large numbers — many noble families have sought to ward off financial decay by the institution of entailed family estates; this process is, however, since 1809 prohibited by law.

Strained relations between the different social classes in Sweden have, however, been mitigated, by that fellow-feeling which, as has been frequently pointed out in these pages, is a characteristic trait running through all classes of the community. Hence it is that all dissensions and infringements of others' rights, that do occur in the course of practical life, are set at rest with less friction than might be expected from a consideration merely of the written and unwritten laws of the land. Yet another circumstance, contributing in its measure to this state of things, is that to *rise in the social scale* is perhaps nowhere so easy of accomplishment as in Sweden, nor do such advances probably anywhere occur so frequently as here. That may be attributed principally to higher education being practically open to all, by reason of the low rates charged for instruction at the public colleges. Thus, at these colleges no less a percentage than 20 to 25 are the sons of peasant farmers or artisans, and about one half of the total number educated at those schools belong, in general, to the so-called lower classes. A great number of the most prominent men in Sweden can thus trace their ancestry back to a member of the lower classes with but one or two intervening generations; the upper and lower classes are consequently strongly bound together by the very closest of ties, namely that of blood. The significance of this will be apparent, if the reader reflects on the striking contrast in certain other countries, where the difference of class often amounts almost to a difference of race.

Additional contributory causes towards the leveling of social distinctions in Sweden may be found in the high status to which popular instruction has been raised; in the, comparatively speaking, equal distribution of wealth; and, finally, the self-consciousness of the individual, that centuries of political freedom have brought in their train, and which asserts itself superior to any and every sort of infringement.

For a statement concerning the **distribution of wealth** in Sweden, there exists, it is true, a considerable collection of data from recent times, but as they have been arrived at for the purely administrative purposes of the exchequer, it is not easy to make use of them here for scientific purposes. Nor is the matter simplified by the tripartite assessment of wealth adopted: real estate in land, other forms of real estate, and income derived from capital and labour, without any information forthcoming as to when and in what proportion any two or all three of these species of wealth are held by one and the same individual.

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Drawing a line between large and small fortunes at the limit fixed as rate for candidateship to the Upper Chamber of the Swedish Diet (viz. real property to the value of 80,000 kronor and an income of 4,000 kronor from floating capital or labour; a krona = 1·10 shilling = 0·268 dollar), we can give a rough estimate as follows of the distribution of wealth:

Of *Real Estate in Land* about 2,000 of the proprietors fall above the given limit and about 270,000 below it, the first category embracing about *one fourth* of the total value of the land under assessment, the second, consequently, three fourths of the same.

Of *Other Real Estate* about *half* the total value accrues to proprietors who rise above the limit; however, it should be noted that in many cases they are joint stock companies, and as such they do not form actual individual property-owners, since the owner-ship is *divided* among the shareholders. Moreover, the figures on which this estimate is based date from 20 years back and may therefore since that date have undergone a not inconsiderable change.

Of *Income from Capital and Labour* about one *third* of the total value falls to the lot of those above the limit, two thirds to those below.

However incomplete this rough statement is, it may yet be said to establish *one* fact beyond dispute, namely that *land* in Sweden is divided up among the population in a much more democratic manner than are other forms of wealth. Only one fourth of the land assessed falls to the category of large property, and yet the limit fixed is as low as 80,000 kronor (4,400 £), a sum which, in this particular case, must be regarded as rather inconsiderable. To further illustrate the condition of affairs in question, it may be added that no less than 85 % of the total number of landed estates in Sweden are worked by the proprietors themselves, leaving only a percentage of 15 for those let out to tenants, though the latter estates are, it is true, on an average, not inappreciably larger than the former.

One item with regard to property ownership in Sweden may be stated with precision, and that is the number of the *entailed estates*. At the close of 1895 they were 167 in number, valued in total at 110 million kronor, or 4·62 % of all real property in Sweden. Reckoned by total value, more than nine tenths of these estates belong to noble families.

To sum up very roughly the results of the preceding, we find that about one third of the total property possessed and income received in Sweden is allotted to a percentage of the population of only two, whereas the other two thirds are divided amongst the remaining 98 % of the people. This may seem a very serious disproportion, but there are probably few countries where the state of things is not far worse in this particular.

As to whether unequal distribution of wealth tends to increase or decrease in Sweden, it is unfortunately impossible to say anything definitely; that, however, *prosperity has, on the whole, increased greatly*, can be demonstrated beyond gainsaying.

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The census records from earlier times — which claim our admiration from many causes — afford us an opportunity of placing the following summary before the reader:

Percentage of Families:	In 1805.	In 1840.	In 1855.
Who had more than enough to live upon...	2·96	9·85	13·75
Who had just enough	25·74	62·74	67·05
Who had less than enough	54·81	22·28	15·93
Who required entire support	16·49	5·63	3·27
Total	100	100	100

Though it is impossible to attach any very considerable importance to the figures in the above table, and that naturally so, when the method by which they were arrived at is taken into consideration, yet it is also inconceivable that the change, in general, to which they bear witness, should be altogether delusive — for that to be the case, indeed the differences in the figures are too great, and the regularity in the course of progress they indicate is too strongly marked.

For recent times figures of this character are lacking; that prosperity has not, however, ceased to increase is amply evidenced by the large increase in *national wealth* of which another section in this work treats.

Moral conditions.

When social science wishes to examine into the moral condition of a people, it must, as is well known, content itself to a very great extent with the study of negative indications. Apart from the criminality, and the phenomena in connection with the temperance question — phenomena that will be dealt with in special sections in the following pages — some facts will be given here concerning the number of illegitimate births, and other data derived from the statistics of population or of medicine, which will serve to throw light upon general and private morals, in the more restricted meaning of this word.

The frequency of **illegitimate births,** which is certainly not the only or even the safest measure of the moral condition of a nation, but which, in any case, illustrates one side of it, forms on the whole, one of the dark sides of the social life of Sweden, even if those conditions are far from being as unfavourable as people often make out.

The frequency of illegitimate births is usually expressed by the per cent of the total number of births. If viewed from the point of the morality of a nation, this frequency, however, ought rather to be compared with the number of middleaged unmarried women. To every thousand unmarried women and widows between the ages of 20/45 years, the yearly total of mothers giving birth to illegitimate children, in Sweden during different periods since the year 1750, and in other European countries during the period 1871/80, has been:

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Sweden 1751/1895:		*European countries 1871/80:*			
1751 75	11·7	Netherlands	17·8	Scotland	37·8
1776 00	17·6	Switzerland	18·1	Sweden	39·4
1801/25	28·8	England	26·2	Italy[2]	42·8
1826/50	32·2	France	30·9	Denmark	45·2
1851/75	37·4	Belgium	31·0	German Empire	51·6
1876 95	37·1	Spain[1]	32·8	Western Austria	66·2
1886 95	36·9	Norway	33·8	Western Europe	40·2

The first column of this table shows that the most marked deterioration took place in our country during the period 1776/1825, i. e. during the very time that was also characterized by the greatest increase in the misuse of spirits. But the table also shows that, *during the last twenty years, this deterioration has ceased* — a circumstance we here take the liberty of especially emphasizing.

In comparison with other countries, we find that the figures for Sweden are *somewhat lower* than the average for Western Europe, and considerably lower than those for Denmark, the German Empire, Austria, and perhaps those for Italy too. But on the contrary, we are certainly far from the favourable condition presented, for example, by the Netherlands.

The principal reason of the comparatively large number of illegitimate births in Sweden is, naturally, the decrease before mentioned in the frequency of marriage, which has resulted in the percentage of married people now being lower than in most European countries.

As to the frequency of illegitimate births in different parts of Sweden, that will be seen from the map on p. 148. The state of things in this respect has of late years undergone a considerable change; in times of old, the condition of Norrland, for instance, was very much more favourable than now. In Norrland and Svealand (with the exception of Södermanland) and also in the läns of Kalmar and Blekinge, the frequency of illegitimate births is *greater in the country* than in the towns.

Of the **other data** which serve to illustrate the moral condition of Sweden, we may here accentuate the frequency of divorce, the extent of prostitution, the frequency of venereal diseases and cases of stillborn children, the difference in the death-rates between married and unmarried persons, and, finally, the suicides.

The yearly total of **divorces,** per million of the population, for the decades 1831/40 to 1881/90 and the period 1891/95, in the order given, has amounted to: 35·1, 32·1, 33·0, 31·9, 43·9, 50·2, and 61·3. The latest periods thus show a pretty great deterioration, but still this does not prevent Sweden's position in this respect from being a more favourable one than that of most of the other countries in Europe.

Regulated **prostitution** is found only in the cities of Stockholm and Gothenburg. At the close of the year 1865, the number of prostitutes in Stockholm was 230 per hundred thousand inh., whereas, in 1899, it was only 162. In Gothenburg, the corresponding figures for the years 1887 and 1900, were 102 and 72 respectively.

The frequency of **venereal diseases,** according to the investigations of J. KJELLBERG and others (at least, as far as can be judged from the number of cases treated in the public hospitals), seems to be on the decline; this holds good not least in respect to syphilis. During the years 1861/65, there were annually admitted to the civil lock-hospitals 118 cases per hundred thousand inh.; in the years 1891/95, on the contrary, only 91 per hundred thousand inh. During

[1] Years 1861/70. — [2] Illegitimate children and foundlings.

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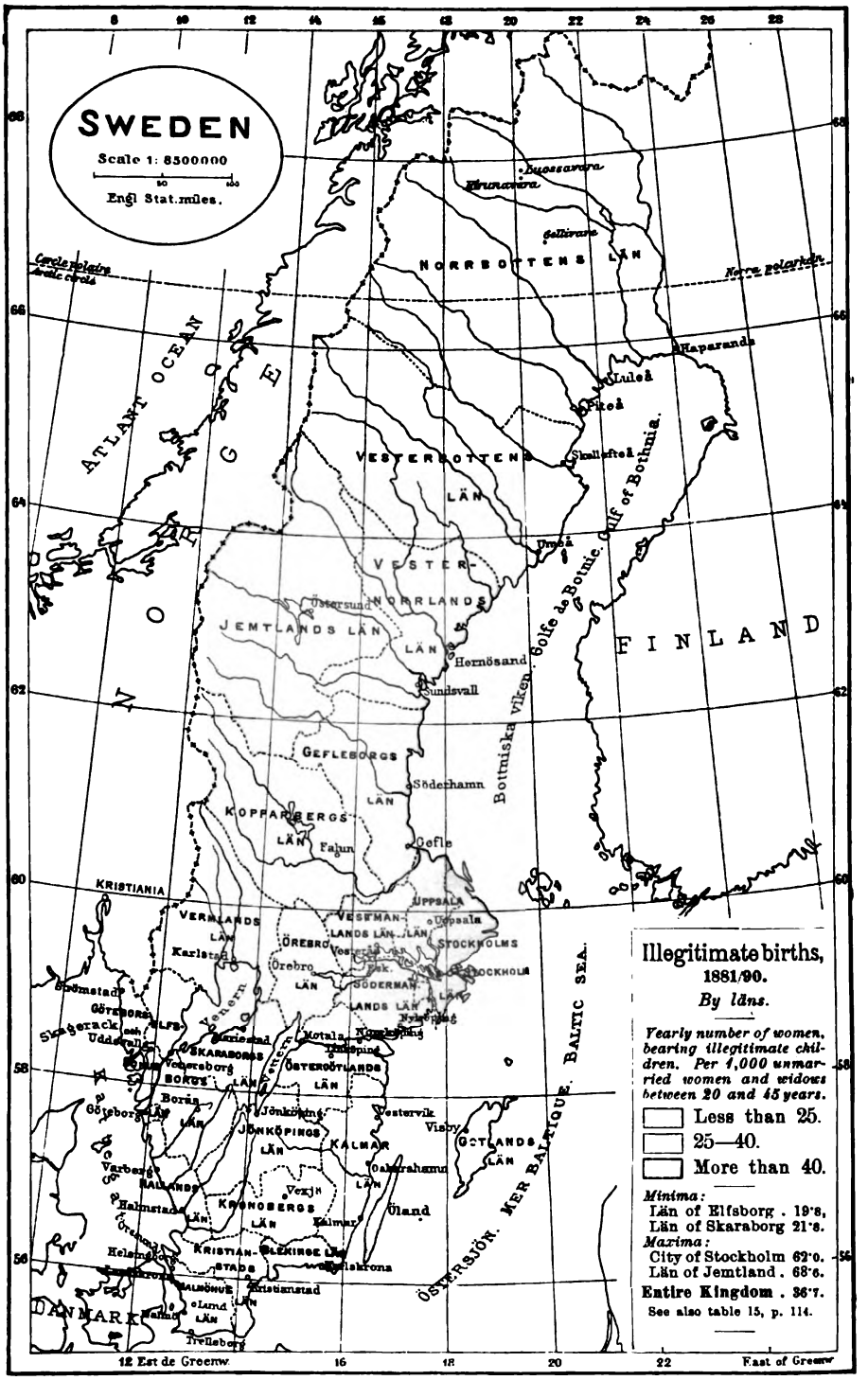

Gen. Stab. Lit Anst. Stockholm

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the former period, 10·0 ‰ of the patients admitted died, while during the latter period, only 4·4 ‰ died. According to the information available, the frequency of these diseases seems to be lower in Sweden than among our nearest neighbours.

Respecting the frequency of **still-born children,** which is considered by medical authorities to be very illustrative of the question of the greater or lesser occurrence of syphilis, it has already been shown on a preceding page (122) that this frequency increased till about 1865, but that, since then, it has diminished in a high degree. The figures for Sweden in this respect, are, on the whole, unusually favourable.

The **death-rate** among the different groups, according to *civil conditions*, gives certain stand-points for judging of the moral conditions of the people. As is known, the death-rate among unmarried men is always considerably higher than that of married men, a fact which, however, depends partly on the circumstance that the latter group, in certain respects, represents a select number, so to say. The difference in the death-rates of married and unmarried men is, however, unusually high in Sweden in the more advanced ages, which, in itself, cannot be a favourable sign. It should be observed, however, that here, too, a change for the better has been noticeable during the last few years. — Between the death-rates of *men* and *women* there appeared a great difference during the period of the greatest consumption of spirits, to the disadvantage of the former; during the last decades that difference has been essentially reduced.

The chapter on **suicides** is, as is well known, one among the saddest in the history about the end of the nineteenth century, and the remark holds good for Sweden, no less than for most other countries. In the following table a survey is given of the frequency of suicides, both for certain groups of ages, sexes, and civil conditions and amongst the population as a whole.

TABLE 27. *Annual number of suicides per 100,000 inhab. in each group.*

Average for the years	Total.	Married men.			Married women.			Single men and widowers.			Single women and widows.		
		15/25.	25/50.	50/ω.	15/25.	25/50.	50/ω.	15/25.	25/50.	50/ω.	15/25.	25/50.	50/ω.
1831/50 ...	6·47	13·1	18·6	19·6	1·5	3·2	5·3	5·6	28·4	22·2	2·6	6·3	3·7
1851/70 ...	7·21	14·2	16·5	23·4	2·4	3·3	5·8	5·5	30·2	35·8	2·8	6·6	6·5
1871/80 ...	8·68	7·2	18·1	26·9	3·1	4·2	7·1	6·1	36·7	54·4	2·9	8·0	8·6
1881/90 ...	10·74	7·8	19·9	34·8	3·2	4·8	8·0	8·4	41·6	65·3	5·4	11·1	8·6
1891/95 ...	14·40	9·1	22·2	38·5	2·8	5·8	11·3	9·6	50·2	86·9	15·6	22·1	12·1

The great increase, on the whole, is apparent. It is, however, peculiar to find that little or no deterioration has taken place among the married men of young and middle age; among the youngest married men, the frequency has even diminished. The greatest increase amongst men is to be found among the unmarried of the higher ages, in which class the number of suicides has almost quadrupled. Still greater, however, of late years, is the increase amongst young, unmarried women, of which more will be said in the section, »The Woman Question», in the following pages.

Compared with other West-European countries, the position of Sweden, as regards the frequency of suicides, has in former times been fairly favourable, but the great deterioration of late years — of which the general cause is somewhat difficult to discover — seems to be setting this favourable position at stake. The figures of Sweden are much surpassed, however, by those of Denmark and also by those of Germany and France.

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Respecting the moral condition of the city of **Stockholm,** exceedingly gloomy descriptions are not seldom to be found in foreign literature. When these accounts do not contain actual inaccuracies or exaggerations, it may be taken as a rule that they are based upon the conditions of earlier periods and that they altogether neglect the changes for the better which have taken place during the last few decades.

In the years 1851/60, 43·4 % of the children born alive in Stockholm were *born out of wedlock;* in the years 1891/95 this percentage had fallen to 28·6. To every thousand unmarried women, in the ages 20/45 years, there correspond now in Stockholm about 62 illegitimate births annually; we may recall the fact that the mean figure for the whole of Western Austria is 66, and we will add that for Bavaria it is 72, and for the kingdom of Saxony 90. Respecting Stockholm it should also be remarked that no small number of the total of mothers giving birth to illegitimate children, consists of women who have betaken themselves to the capital merely for concealment of birth. — The number of *still-born children* in Stockholm has fallen from 55·5 ‰, for the years 1856/60, to 28·7 ‰, for the years 1891/95. We have before mentioned the decline in the number of *prostitutes.* — As concerns the *consumption of spirits,* it may be mentioned that when, in 1877, the sale of alcohol was taken over by a company, in accordance with the «Gothenburg system», it disposed of about 13 litres of alcohol per head of the Stockholm population during its first year of activity, while nowadays it sells but 8 litres per head. And in the years 1871/75 there were treated in the city 32 cases, per hundred thousand inh., of *alcoholic diseases,* while for the years 1891/95, the figure was but 18.

That the *death-rate* in Stockholm has undergone an unparalleled diminution, has been already mentioned. For the years 1851/60 the whole death-rate amounted to 41·5 ‰ annually; for the years 1891/95 it was but 20 ‰, and for 1896/1900, about 18 ‰. Only few great cities can nowadays compete with Stockholm in lowness of death-rate. — Finally, it may be added that during the last few decades both the *frequency and the fecundity of marriage* have increased.

If it be also remembered that, during the last fifty years, the population of Stockholm has trebled in numbers, and that its administration and public institutions of all kinds have, during this period, reached a standpoint which has often been acknowledged as exemplary, it may with truth be said that the capital of Sweden is, nowadays, something quite different to what it was during the first half of the century, and that a work of reform and regeneration has been carried out, to which for scope and strength it would be difficult to find a parallel.

Criminality.

Of all the branches of statistics, there is assuredly none of which the results are so difficult to judge correctly as criminal statistics, and yet investigation is compelled to return to it, over and over again, to endeavour to gain at least *some* light upon the gloomy problems presented by it to the human race. Concerning the statistics of criminality in Sweden, some chief data for older and newer periods are collected in Table 28. These figures are, no doubt, both fallacious and not fully commensurable with each other, but they give, in any case, the best information that can be gained on the subject.

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TABLE 28. *Some data concerning the frequency of crimes in Sweden.*

Average for the years	Both sexes.	Men.	Women.	Age.	Both sexes.	Men.	Women.	Average for the years	Infanticides.	Other homicides.	Larceny.[4]
A) *Crimes, 1861/1900.*[1]				B) *By ages, 1881/90.*[2]				C) *Special crimes.*[3]			
1861/65...	53·0	92·1	16·0	0/10.....	·	·	·	1751/75...	3·80	8·00	·
1866/70...	55·8	96·2	17·6	10/15.....	6·2	11·4	0·9	1776/00...	4·68	7·15	·
1871/75...	42·9	74·5	13·2	15/20.....	71·1	124·7	16·6	1801/20...	4·52	9·15	·
1876/80...	38·4	67·3	10·9	20/30.....	105·7	185·6	29·7	1821/40...	3·95	12·73	837
1881/85...	40·2	71·0	11·3	30/40.....	61·5	111·3	16·4	1841/50 ..	4·36	17·00	954
1886/90...	36·5	65·1	9·5	40/50.....	40·0	71·4	12·2	1851/60...	4·72	10·76	667
1891/95...	41·5	74·1	10·9	50/60.....	22·7	41·4	6·5	1861/70...	7·58	11·42	602
1896/00...	44·9	81·6	10·0	60/70.....	10·9	21·1	2·3	1871/80...	9·14	12·42	581
				70/ω.....	3·0	5·9	0·9	1881/90...	6·57	9·14	528
1861/75...	50·4	87·4	15·5					1891/95...	6·25	8·86	615
1876/00...	40·3	71·8	10·5	Total	38·3	68·0	10·3	1896/00[5]	4·80	9·00	570

If we look at the first division of this table, we find that the yearly number of people condemned for *crimes*, from the period 1861/75 to the period 1876/1900, has *fallen* from 50·4 to but 40·3 per hundred thousand of the population. To this gratifying result, the decline in the misuse of intoxicating liquors has certainly contributed together with the improvement in popular instruction, the increase of wealth, and the far-reaching religious and other humanitarian movements which, during this time, have so powerfully worked upon our people. But some of it ought, no doubt, to be ascribed to the emigration, which has carried away, not only a great number of the smartest and most capable part of the population, but also a very great number of its unquietest elements.

After having thus stated an improvement as being the rule, it must, on the other hand, be admitted, that the time subsequent to 1890 again is characterized by a certain deterioration. This has especially been the case concerning the latest years, during which several crimes have attracted a large share of public attention. To a certain degree, this sad circumstance may be explained by the fact that in times of favourable economy personal transgressions always show a tendency to increase; other causes are, perhaps, a legislation and an administration humane to excess. In other respects, too, the phenomenon in question no doubt calls for earnest reflection. That the conditions, however, — neither in comparison

[1] Annual number per 100,000 inhab. of those pronounced guilty of serious crimes. It ought to be noticed that the increase for 1891/1900 is *partly* apparent only, depending upon certain crimes before having been counted among the »lesser ones» but now being reckoned to the number of the serious. — [2] Annual number of those pronounced guilty of serious crimes, per 100,000 inhab. within each group. — [3] Annually per *million* inhab. The numbers of infanticides, homicides, and assassination are gathered from the statistics of population. For earlier times the heading »infanticides» comprises all child-murders, whereas from 1861, only infanticide in a legal sense; the effect of this on the result will, however, prove rather insignificant, and all the more so as the numbers for 1861/00 are sure to be more complete than those for earlier periods. It will have to be noticed that according to the figures in the Table above, there came during the years 1751/75 an average number of 4 infanticides on every thousand of mothers to illegitimate children, whereas in our days, only about 1 or 2. Concerning other kinds of crimes than those mentioned here, some data are given for the period 1891/95 on page 153. — [4] Petty thefts included. The first figure comprises the period 1831/40. — [5] Provisional figures for the year 1900.

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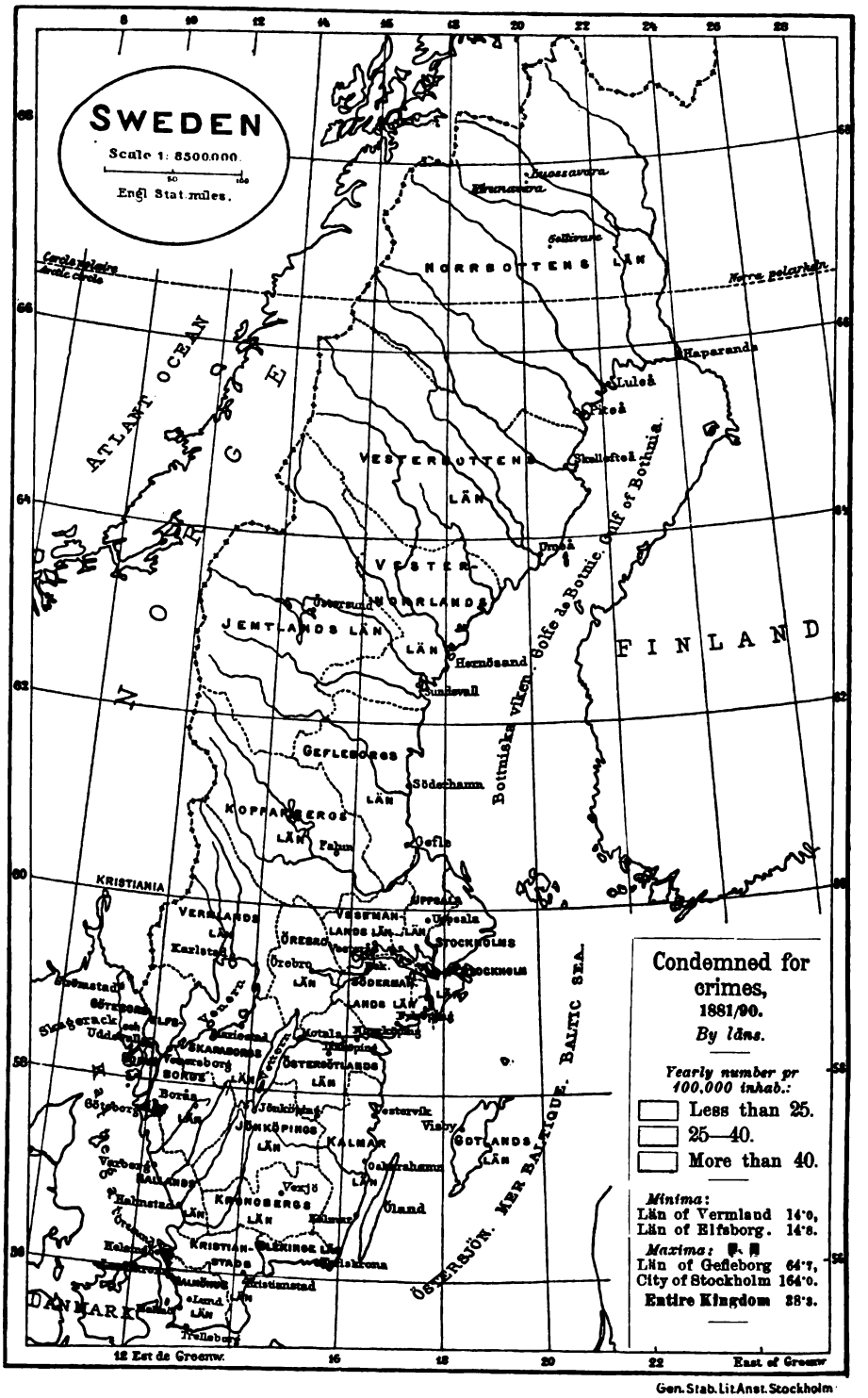

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with those of times past, nor yet with those among other nations — are so disadvantageous as at times declared, of that statistics bear witness beyond contest. Speaking generally, our long wars have left in the temperament of our people a certain residue of violence, which is not to be found in the same degree with our neighbours — amongst them again the frequency of many other kinds of crimes is greater than in Sweden.

From Table 28 it will be seen that the frequency of serious crimes is beyond comparison greatest in the ages 20/30 and next come the ages 15/20 and 30/40. The complaint heard in our days from nearly all nations about an increasing frequency of crimes among *minors* has made itself heard in our country too, and a minute investigation has shown that a deterioration really has taken place in the first years of youth (15/20), whereas the school ages, properly spoken, rather show an improvement.

Of those condemned for serious crimes during the period 1881/90, 76 % of the men, and 77 % of the women, were unmarried. Of the whole number, 1·34 % were analphabetists, while no less than 23·3 % were unable to write, a number which is many times greater than that for the population in general. There were 1·6 % in very good financial position; 21·6 in good financial position; 46·7 % in narrow circumstances, and 30·1 % were destitute of means. 8·65 % had been born out of wedlock, a figure which indicates a higher frequency of criminality in that group than amongst the rest of the population.

During the years 1891/95, the frequency of certain kinds of serious crimes — expressed in the annual numbers of condemned per million of the population — was as follows: offence against public authority 30·4 (increasing), forgery 25·3, perjury 4·59, murder and attempt to murder 1·74, assassination and homicide 7·20, infanticide, feticide, and the like 13·20, assault and battery 57·3 (increasing), rape 2·03, outrage 6·66 (increasing), incendiary fire 5·38, theft 252, robbery 2·44, fraud and treachery 17·2 (increasing), other kinds of crimes 16·4; thus altogether 442, or — after subtraction of those guilty of more than one crime — about 415. Of some among these crimes Table 28 offers a survey, also for times past, which is of considerable interest in many respects.

The frequency of serious crimes in *the different parts of the country*, during the years 1881/90 is shown by the map on page 152. The minima are to be found in the same provinces where the frequency of illegitimate children is lowest, and where also the death-rate is at a minimum.

As serious crimes, we have above reckoned such offences as cannot be expiated by a fine. A total of 185 per hundred thousand inh. were condemned, yearly, during 1891/95, for **lesser offences**, and 602 for **misdemeanours**. The greatest number of the offences last named were cases of drunkenness.

Customs and manner of living.

We may here give a brief notice — which, very naturally, does not in any degree pretend to be an exhaustive one — of the dress, food, ways of living on feast-days and week-days, and manners and observances amongst our people in general, and in its various classes.

The **dress** of our nation is, as with all modern, civilized peoples, in accordance with general European fashions, which nowadays very quickly reach even the remotest districts. Only in certain parts of Dalarne and of Lappland are the old national costumes still in general use; in other outlying districts they have disappeared during the last two generations. Some of these becoming

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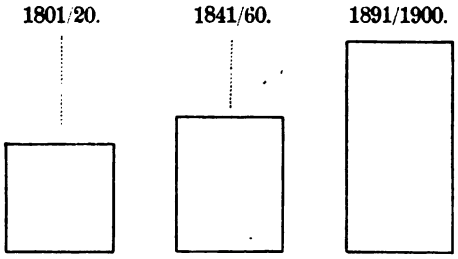
Yearly consumption of wheat and rye per inhabitant.



dresses are sometimes adopted in our times, so deeply interested in everything historical, for use on festive occasions, and out of doors, by women of the upper classes: this is the case with the pretty costumes from Rättvik in Dalarne, from Vingåker in Södermanland, from certain parts of Helsingland, Blekinge, and Skåne, etc. These richly coloured dresses — often to be seen at Universal Exhibitions and in tourist-albums — may therefore be considered as being pretty generally known even abroad.

As regards the working classes, their demands in the matter of dress have greatly increased of late years, and the Swedish workman nowadays always shows himself well-dressed after working-hours, which was far from always being the case some decades back. At the present time, the distinction in dress, as regards cut and style, between different classes of the community, is practically effaced, at least as far as regards the younger generation. Amongst the female population, the bonnet or hat and kerchief («schalett») long remained a shibboleth for the upper and lower classes, but the bonnet has long since emerged from the struggle in triumph. — In Skåne, wooden shoes were formerly in pretty general use, but, of late years, leathern shoes have become predominant, not only in the towns, but also in the country districts.

TABLE 29. *Yearly consumption per inhabitant, 1891/95.*[1]

Country.	Wheat and rye. Kg.	Potatoes. Kg.	Coffee. Hg.	Tea. Hg.	Sugar. Kg	Tobacco. Hg.	Spirits. Liter.[2]	Beer. Liter.	Wine. Liter.
Sweden	175	242	34·5	0·31	16·08	10·58	6·67	27·6	0·6
Norway	135	241	38·6	0·50	9·09	9·50	3·54	20·1	1·2
Denmark	287	170	30·5	1·90	21·23	17·00	14·40	87·7	1·6
Finland	180	122	22·3	0·25	5·89	12·79	2·86	8·8	0·6
Great Brit. and Ireland	167	141	3·3	24·87	36·75	7·45	5·20	135·0	1·7
Netherlands	202	336	67·3	5·93	12·13	33·11	8·83	34·6	2·0
Belgium	274	498	38·6	0·11	9·82	21·36	9·70	183·6	3·9
German Empire	230	537	24·1	0·51	9·94	15·40	8·80	109·6	5·7
Austria-Hungary	173	236	8·7	0·18	7·68	17·32	9·00	39·2	14·2
Switzerland	214	436	28·6	0·72	16·58	21·00	6·12	51·9	60·7
France	254	282	18·4	0·17	11·51	10·76	8·54	22·8	112·8
Italy	122	19	4·2	0·01	3·25	5·54	1·25	0·6	96·5
Spain	149	59	3·1	0·04	5·35	11·80	1·00	1·3	115·0
Portugal	102	32	3·9	0·50	5·88	4·55	1·00	1·0	95·6
Russia	172	142	0·5	3·09	4·84	5·65	9·40	4·6	3·3
Balkan States	138	5	3·1	0·11	2·36	9·10	9·00	2·8	90·0
Western Europe	192	258	15·7	4·77	13·77	11·86	6·15	63·0	48·7
Eastern Europe	168	134	1·4	2·28	5·12	8·09	9·23	9·3	13·0
Europe	183	210	10·3	3·82	10·48	10·43	7·32	42·6	35·1
United States	129	63	39·1	6·08	29·20	25·50	5·95	58·1	1·5

[1] For some countries of south- and east-Europe, the figures are occasionally older. A kilogram = 2·205 lbs. A hectogram (Hg) = 0·22 lb. A liter = 0·2201 imp. gallon = 0·2642 winch. gallon. — [2] Reduced to 50 % alcohol.

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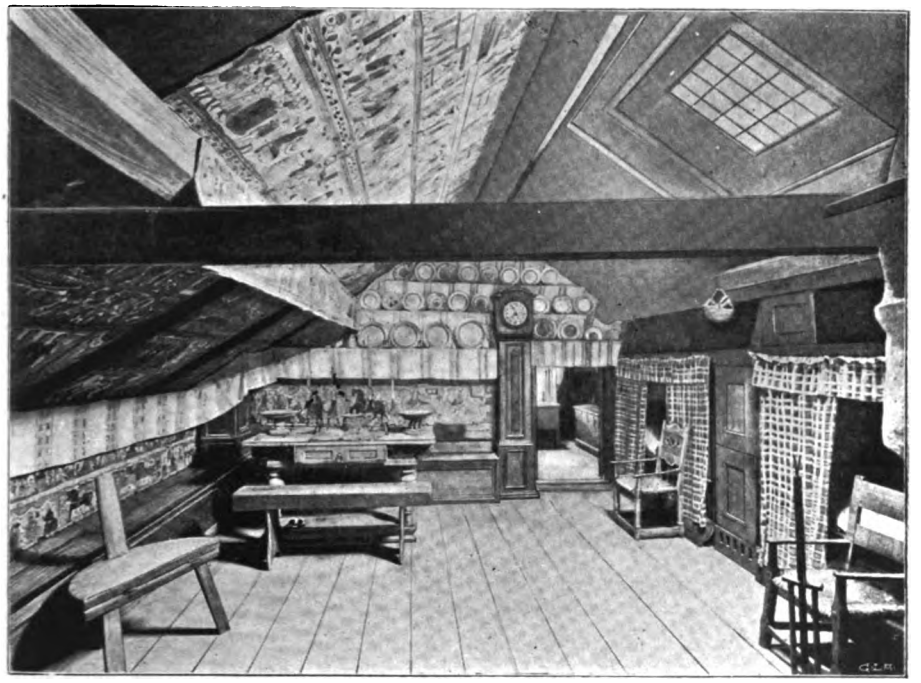
The **food** in the country districts of Sweden is decidedly better and more substantial in the fertile level tracts, than in the less productive forest and hill districts. *Rye* has hitherto been, in the greatest part of the country, the kind of grain most used for bread, but of late years, *wheaten* bread has come more and more into use, a circumstance which is partly explained by the fact that rye-meal and wheaten-flour are, nowadays, often enough, equally dear. In Norrland and in Dalarne a mixture of rye and barley is used for bread; in the districts producing chiefly oats, a mixture of rye and oats is employed. The hard rye bread, called «knäckebröd», is well known to visitors in Sweden; it can be kept for any length of time without losing its flavour. Nowadays, the use of this bread has spread as far as to the most southern provinces of our country, where the people formerly used soft bread exclusively. While speaking of »knäckebröd», we may also mention the Swedish «smörgåsbord», a custom that our country shares with Russia, and which consists in beginning the meal with bread and butter (and spirits), together with which are eaten small quantities of a great many kinds of dishes served cold, or sometimes even warm. This custom is, however, on the decline at present.



The interior of Oktorp Farm-yard, preserved in the Skansen Open-air Museum in Stockholm.

In Table 29 a comparison is made between Sweden and other countries, in respect to the consumption of some more important articles of food, while Table 30 gives a view of the increase or decrease in this consumption in our country during the last generation. On the diagram, page 154, the view of the consumption of wheat and rye goes back as far as to the beginning of the century. The great increase in the consumption of the finer kinds of grain, especially of wheat, is very prominent. The use of *coffee* has also very greatly increased,

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especially of late years, and, on the whole, our population must now be one of those most addicted to coffee-drinking, (in North Sweden, this use is often carried to excess, especially on the part of the women). *Tea*, on the other hand, is still confined to the wealthier classes. The consumption of *sugar* has increased enormously, in consequence of the falling price and the rise of a native sugar production: sugar has, on the whole, always played a very great part in Swedish households.

The consumption of *meat* is calculated by P. FAHLBECK as being, for the years 1885/88, about 28 kg. per head, yearly, which is about the same as the European average. This consumption has doubtlessly increased of late years, although no figures on the subject are at hand. On the other hand, the consumption of *milk* — calculated by G. LILJEHOLM as being, for the year 1885, 183 litres per head (certainly an unusually high figure) — is nowadays less than before, as an ever increasing quantity of milk is used in butter-making. The annual consumption of *butter* in Sweden is, according to P. Fahlbeck's calculation, 5·54 kg. per inh. — a very high figure on the whole, when compared with those for the greater number of other countries.

The use of *intoxicating liquors* had, during the first part of the nineteenth century, reached a height which attracted an attention unfavourable to our people. A detailed account of these circumstances, and of the energetic temperance work of the last decades, is given by the section «The Temperance Movement» in the pages following. Here we shall only point out, with reference to Table 29, that the position of Sweden is, nowadays, by no means a specially unfavourable one in this respect, but that the consumption of spirits in our country, even if it still be greater than in Norway and Finland, yet falls below that for Denmark and the average for Europe. — A so-called «national Swedish drink» is «*punch*», which, however, is only drunk by the better-off classes; people abroad often form a very exaggerated picture of its use, and of its importance in Swedish social life.

TABLE 30. *Yearly consumption per inhabitant, in Sweden.*[1]

Average for the years	Wheat. Kilogr.	Rye. Kilogr.	Potatoes. Kilogr.	Coffee. Hg.	Tea. Hg.	Sugar. Kilogr.	Tobacco. Hg.	Spirits. Liter.[2]	Beer. Liter.	Wine. Liter.
1861/70.....	17	109	202	17·3	0·08	4·87	7·13	9·76	11·0	0·42
1871/80.....	23	123	242	23·3	0·11	7·63	9·76	10·96	16·8	0·76
1881/90.....	35	132	235	30·4	0·18	10·57	9·72	7·50	21·8	0·61
1891/95.....	51	124	242	34·5	0·31	16·08	10·53	6·67	27·6	0·62
1896/00.....	52	125	223	48·1	0·38	18·48	11·27	8·04	33·4	0·68

On the whole, it can be said that the consumption of the more substantial victuals (with the exception of milk) has very greatly increased among our people, a fact which undoubtedly bears witness to a rising economical prosperity. The consumption of *spirits* is, on the contrary, decreasing, and the use of *tobacco* is, from a European point of view, only moderately spread — but with a disproportionally large share for snuff. The noticeable raising of the »standard of living», to which most of the figures concerning food-consumption bear witness, has certainly contributed in a high degree to the notorious progress in point of physical development, and the great decrease in the death-rate, a fuller account of which has been given in the preceding pages.

[1] For reduction to English weights and measures, see under Table 29, page 154. — [2] Reduced to 50 % alcohol.

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The **households** in Sweden were, far into the nineteenth century, often very large, but their average size has diminished in later times, as the number of servants is less numerous, and the assistants in employments nowadays only exceptionally belong to the household of the employer. At the census of 1870 there were to be found for every thousand households 195 women servants, but in the census of 1890, only 129. A great number of Swedish servant girls emigrate every year to America, where they are much in request on account of their reliability and willingness.

On the way to the hayfield. Photo. GÖSTA FLORMAN, Stockholm.

Volumes have been written concerning the **manner of living**, the **customs**, and **observances** of our people, as of other nations; to do more here than make some few scattered allusions to the same, is, of course, impossible. As for the educated classes, their ways of life are, on the whole, like those generally found in the Western Europe of to-day, with that shade of distinction which can be derived from the special characteristics of our nation, such as the marked disposition to entertain and to show hospitality, a certain pretentiousness concerning necessities of life, but also the polite tact and chivalrousness, that real humanity in the widest sense of the word, which are so often found in the educated Swede. The Swedish temperament's having also the characteristics of being easily kindled and somewhat fantastic, lends very naturally its colour to our manner of living, which is no less marked by the strong appreciation of Nature — a feeling which, in our days, expresses itself in a well developed tourist- and sportinglife. In the lower classes all this recurs in simpler forms, and also respecting the manner of living, the gaps between different classes diminish more and more. — It has already been mentioned in the preceding pages that a certain coarseness of disposition still exists in many places, as an inheritance from the

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century-long wars; on the other hand, the generally spread art of reading and the awakened desire of knowledge, give a moral elevation which is not to be found in a people less favoured in this respect.

It has been hinted above that the Swede likes to «make a great show» on festive occasions. In every-day life, the way of living is, on the contrary, generally very plain, among the poorer population, during hard times, not seldom full of privations. The greatest festival of the year is *Christmas*, which is probably observed for a longer time and more thoroughly than in any other country. The yule preparations often last whole weeks, and not only aim at obtaining as much outer cleanliness and comfort in the home as possible, but also at providing a rich supply of all kinds of food and drink, so that the feast itself may, to the greatest possible extent, be a time of enjoyment and repose.

Ancient National Garb worn in Ingelstad, Skåne. Preserved in the Northern Museum in Stockholm.

The best known of our Christmas customs is the use of the Christmas-tree, which, however, has become more general only during the last fifty years, and has not yet reached the peasantry. Early on Christmas morning, all gather in the church, which is then brilliantly lighted; the journey thither through the dark winter-morning (the way often having to be lighted by torches — at least, so it was formerly) — not seldom succeeded by a racing drive home, is a pleasure which neither young nor old willingly forsakes. Amongst the minor popular feasts may be named, *Walpurgis Night* (the night after the 30th of April), which formerly was kept in many places by lighting large bonfires, and *Midsummer* (June 23rd and 24th), a favourite festival in Sweden, which is celebrated by decorating houses, ships, and vehicles with young birch-trees, and during which everybody tries, as far as possible, to spend the whole day in the open air.

Amongst the festivities of family-life, *wedding* was formerly celebrated with extraordinary preparations, which nowadays, however, are becoming plainer

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and plainer. The close of the *harvest* gives occasion, in many parts of the country, to exuberant festivities; these too, however, of late years have become much more temperate, owing to the declining use of intoxicating liquors, and, in a very great measure, to the graver and more serious bent of the national character, which is a consequence of the strong religious movements amongst our people during the last two generations.

On the whole, it cannot be denied that, in Sweden as elsewhere, the increasing severity of the «struggle for existence», and the profound social movements, have cast a gloom upon the joy of life, a phenomenon, about the fullest consequences of which — both for good and for evil — the future only will be able to judge.

Oktorp Farm-yard, preserved in the Skansen Open-air Museum, Stockholm.

Dwellings.

The character of the Swedish climate renders it a primary necessity that dwellings should be built so as to secure warmth. Hence, houses have to be of solid construction, and every room must be provided with a fireplace, usually an earthenware tile stove. Double windows during winter are also almost universally regarded as an essential. As these requisites render the expense of construction relatively great, the number of rooms has generally to be limited to a minimum, though their size is customarily fairly large.

Apart from houses in large towns and from occasional better-class residences elsewhere, dwellings in Sweden are still principally built of

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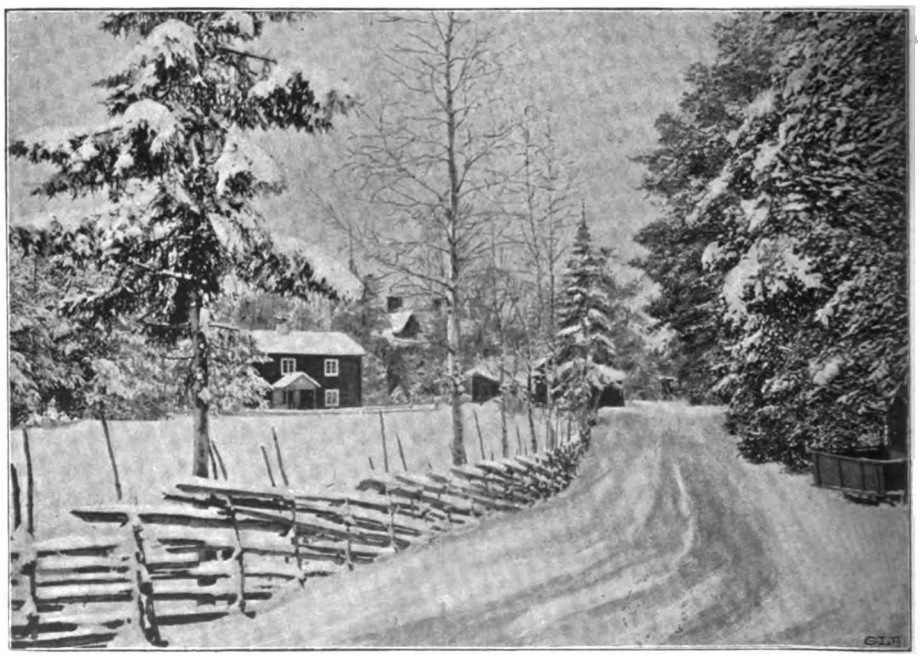
wood. This time-honoured building-material is giving place but slowly to stone. Even of the towns it is only the larger ones and those that have had to be rebuilt in recent years, owing to their partial or total destruction by fire, that have a majority of stone structures to show. In the others, wooden houses still exist in much larger numbers, and that in spite of the fact that legislation is not wanting to restrict their increase. In the country districts, where restrictions of that kind are unknown, wood holds the day almost unchallenged, and increasingly so the further north one proceeds. Stone and wood are used in about equal proportions in the island of Gotland and some small districts in South Sweden, though throughout Skåne stone is traditional, being employed not only in towns, but also in the country.

A **Peasant's** domicile traditionally consists, in its simplest form, of a cottage, embracing, besides an entry, the cottage proper (Stugan), a fairly large room serving as kitchen, living-room, and bedroom, and a small bedroom (Kammaren). As means and demands grow, the building is enlarged by the addition of either another room on the same level or another story, or by both these adjuncts. A large peasant-farm will often have a cluster of two or more houses of the kind, especially in Northern Sweden. In Skåne, Gotland, and some other parts, the farm-houses are often found considerably extended in length, though only of one story — in analogy with the Danish and German mode of building. The farm-buildings, consisting of granary, stable, cow-house, and threshing-floors, are generally to be found in the immediate vicinity of the farm-house itself, often with it enclosing the farm-yard; a garden, though it be but a small one, is hardly ever wanting.



Dalarne. Winter landscape. Photo. O. Sundberg, Hedemora.

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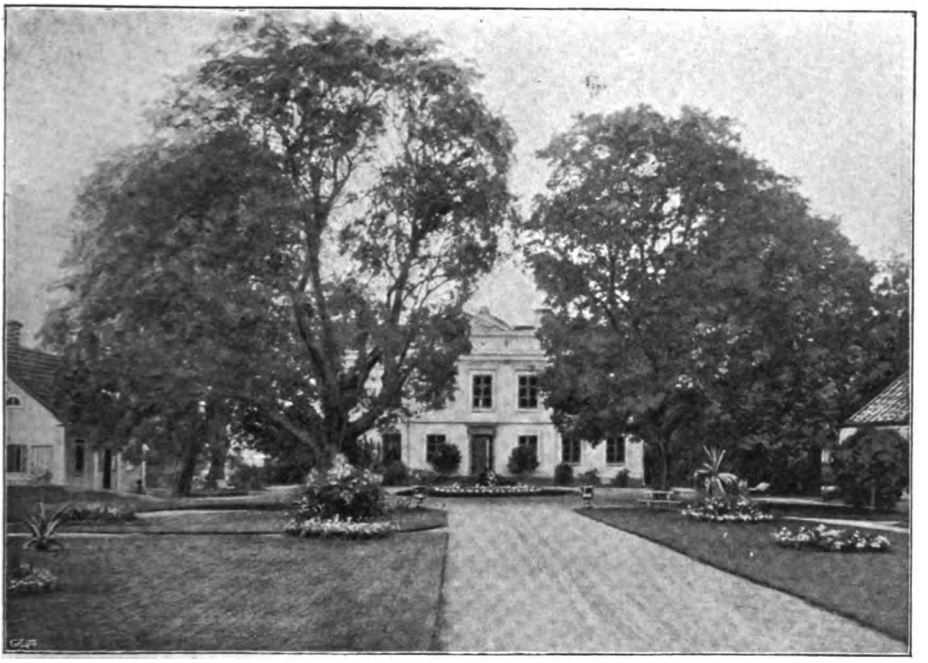
A special group of country dwellings is constituted by the smaller **Manor-houses** and the **Residences** set apart for the clergy, civil servants, and army officers, though in the two last cases the system of providing such residences has been for the most part done away with. The simplest type of these dwellings consists of four rooms and a kitchen on the ground floor and two or more attics. Where means and opportunity permit, the house is extended, either laterally or by the addition of an upper story, or of a pediment giving space for one or more attic rooms. The main building is usually flanked by a couple of wings of smaller dimensions, for the servants and the farm-management.



Täckhammar. Manor-house in Södermanland.

Large Manor-houses and **Castles** are to be found more or less frequently in Central and Southern Sweden, but only rarely in the northern provinces. The appearance of these residences differs in different parts of the country, the style of architecture they display often depending on the dates at which they were erected. Those in Skåne are both the oldest and the largest; the majority were built in the 16th century and in style resemble Danish buildings of the same period. Remnants, though for the most part but fragmentary in extent, still exist of medieval castles, not only in Skåne, but also in the rest of Southern and Central Sweden; where, however, they — and indeed castles of the 16th century too — are rare, if the royal castles are excepted. The latter are dealt with under the head of »Architecture».

The 17th century, the period of Sweden's political greatness, was the golden age of the Swedish Manor-houses; then the generals having returned from the wars vied with each other in the magnificence of the castles they erected. The number of these castles is greatest in Södermanland and the other provinces round Lake Mälaren, and they are finest there. Instances are: the Castles of Eriksberg in Söderman-

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Trolleholm Castle, Skåne.

land, of Skokloster in Uppland, and of Tidö in Vestmanland, the latter built by Axel Oxenstierna; all of these are preserved to the present day practically in their original state.

During the 18th century castles were also erected, though in number and importance they did not compare with those of the century preceding. It was, however, the 17th and 18th centuries that determined the type of manor-house which still prevails in the Sweden of to-day.

Recent Times have brought about great changes in the building of dwellings in the country districts. Increased demands for comfort, the example of town-dwellings, and the custom, which has even penetrated to the country, of building houses for the purpose of letting — those causes, in conjunction with an often misdirected or impaired sense of beauty, have led to the abandonment of the original types of dwelling above described and to the efforts to find new ones to replace them. A mode of construction at once simple and substantial yields to a more imposing one, by preference in the villa-manner; the traditional coating of red colour, that, either with or without the setoff of white corners, is so characteristic for Swedish wooden houses in the country, and is so durable, and so picturesque in the surrounding landscape, is being replaced by one of neutral oil-colour tints, or by plaster; the ancient roofing-materials, turf, shingle, and tiles, formerly in use, are being supplanted by sheet-iron, asphalt roofing-felt, &c. These innovations and experiments have not hitherto resulted in any very practical type of building being evolved for the country, but have succeeded, nevertheless, in robbing it of its pristine aspect of simple dignity, from an esthetical point of view, a dignity which was a unique characteristic of the dwellings erected in earlier times, and which harmonized so well with the scenery around. To endeavour to regain

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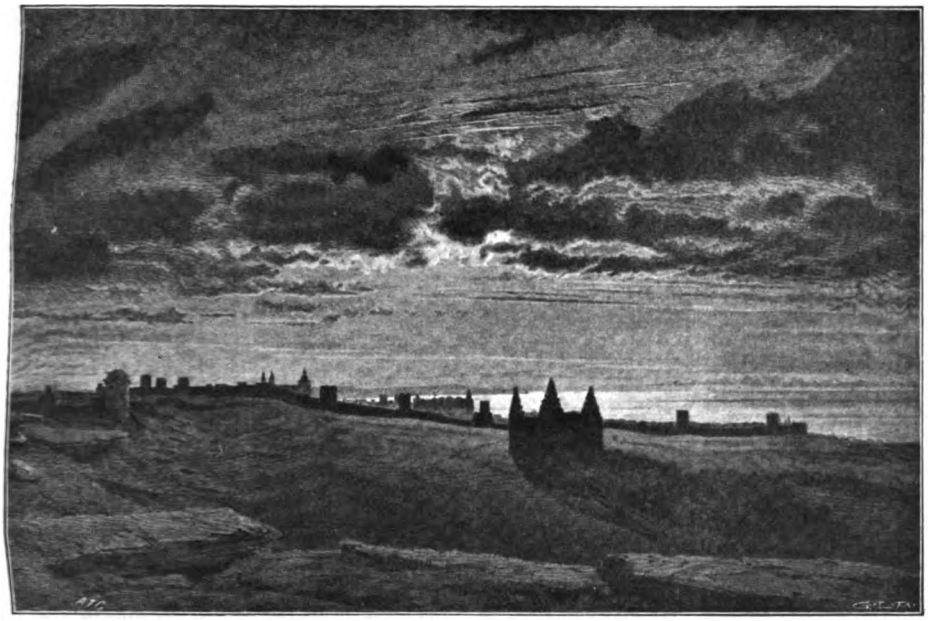

Visby in the Island of Gotland.
From a painting by A. TH. GELLERSTEDT.

this characteristic and at the same time to respect the requirements of the day, are the objects to be kept in sight by the regenerators of Swedish architecture.

Almost half the number of Swedish **towns** date their existence from the middle ages; of the rest, most arose in the 17th century, some few in the 16th and 18th, while 10 or more are wholly the product of the 19th century. The city of Visby, with its numerous picturesque ruins, preserves quite a medieval aspect. A relic of the same period, in plan at all events, is also seen in the »City» of Stockholm. Reminiscences of the middle ages are, moreover, also to be found in the towns of Skåne in comparatively large number, and in the towns of the rest of Southern and of Central Sweden, though less frequently; in Northern Sweden, on the other hand, they are almost entirely wanting. Swedish towns have little to show that can be traced back to the 16th century, but of the two following ones, more especially the 17th, there are very palpable marks. That is peculiarly true of Stockholm. In the main, however, both the capital and the provincial towns are predominantly modern in stamp. Buildings of the 19th century are the rule, those of other centuries being the exception. The causes of that are to be sought both in the ravages wrought by war and by fire, ravages always rendered more severe by the employment of wood as a building-material, and also in that increasingly noticeable and oftentimes violent desire to modernize that has taken possession of the public.

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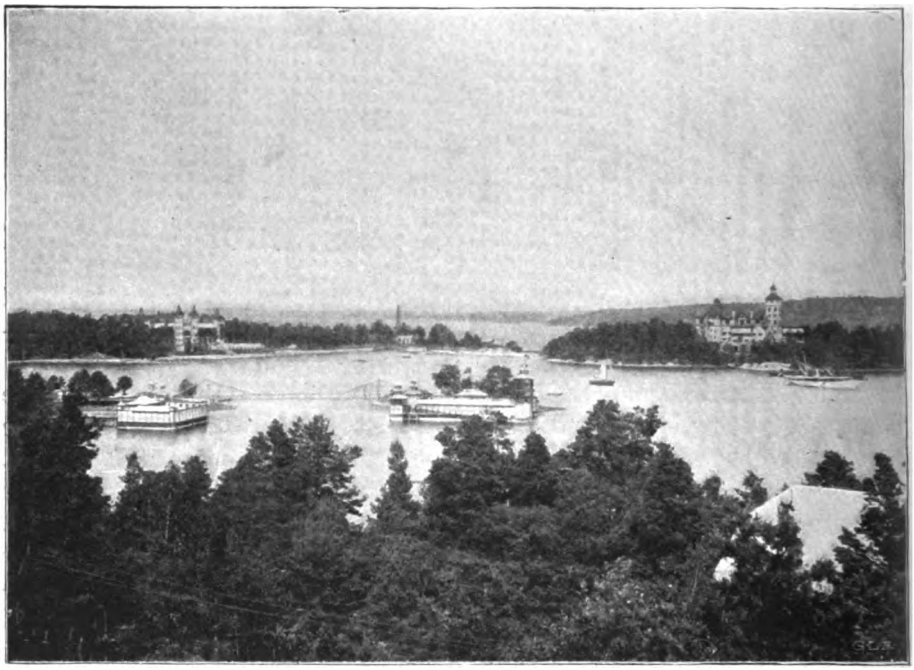
This modernizing fever has received a powerful ally in the new town-regulation proposals adopted during the course of the past few decades in most Swedish towns, the plans so passed being chiefly on the well-known chess-board system, little respect being paid by them to existing circumstances and conditions; the general Buildings Act of the year 1874, applicable to the towns of the whole country, works in the same direction. Of the different sections of that act the following may be mentioned here: the breadth of a street shall be at least 18 meters (exceptionally only 12), that not, however, to be applied to the esplanades, which are to be broader and planted with trees; the height of the houses must not exceed the breadth of the street, increased by 1 1/2 meters, and they are allowed a maximum of five stories; the area of the court-yard shall be one half (exceptionally only one third) of the space built upon; the minimum height of a dwelling-room shall be 2·7 meters at least, and the floor shall be at least 0·3 meters above the level of the ground, &c.



Saltsjöbaden, near Stockholm.

Owing to legislation for the methods of building, and above all owing to the water-supply- and drainage systems introduced in most towns, together with other precautionary measures, the danger from fire has been considerably reduced, and the demands of health and sanitation have been duly considered and met.

The effect of the new régime has been less satisfactory as regards the actual appearance of the towns from an *esthetic* point of view. In place of ancient, picturesque and oftentimes historic buildings, that have been swept away, there now stand new structures of regular form but wholly lacking in interest. The protests, however, raised by the artistically minded in the country against the

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style of building now in vogue, have already been instrumental, in some measure, to infuse a more catholic taste, and to revive a reverence for the relics and traditions of the past.

The system, authorized by law, of building so spaciously has, moreover, proved of doubtful advantage from an *economical* point of view, the price of sites and the cost of building generally having very much increased. This is one of the reasons why building enterprise in Swedish towns, great and small alike, has been directed, to a greater extent possibly than elsewhere, to the erecting of houses to be let out in flats, rather than of private residences to be inhabited by one family. Setting aside the disadvantages inevitably incident to a system of that kind, it may be affirmed that in general the houses which have been recently put up satisfy fairly well all reasonable demands for perfect sanitation, modern comforts, and general elegance.

A working-man's family in a Swedish town has, as a rule, to content itself with one room and a kitchen, or, in favourable circumstances, with two rooms and a kitchen. The two-room-and-kitchen suites are becoming more common, where rents are not abnormally high. One room is, though, often sublet to a single lodger; indeed the same is sometimes the case with regard to the one-room-and-kitchen suites in Stockholm and other large towns. The reform work being carried on by Housing Societies and Employers towards the improvement of workmen's dwellings, is discussed in another section of this work. — The middle classes in towns live in suites of 3, 4, or 5 rooms and a kitchen. Houses with suites of 6, 7, and 8 rooms, to be let as flats, are very general, and are equipped with a great degree of comfort, often amounting to luxury, and with considerable pretensions to architectural beauty. In the case of the last-mentioned houses, the material generally employed is some natural stone, limestone or sandstone, several varieties of which are found in great abundance.

It may be a cause for surprise that persons who are in a position to afford to pay two thousand kronor, or even more, a year in rental, should not prefer to build private houses of their own. The explanation of their not doing so is to be sought in the high charges for building-sites and the great cost of building, as pointed out above, and in the dislike that seems to prevail in the minds of a great many of having their rooms on different levels, on the story-system. The private houses erected lately are of a more palatial character.

Nor has the *Villa* as a residence been adopted at all generally, at any rate in the large towns. The villa-quarters, the laying out of which was planned in Stockholm, have not reached completion, though in Gothenburg the system has met with somewhat more favour. Greater success has attended the *Villa-Suburbs*, situated at convenient distances from the city. Instances of these are Djursholm and Saltsjöbaden, at six to ten miles' distance from Stockholm, with beautiful natural surroundings, on the shores in the »Skärgård», and inhabited by persons whose work lies in the city.

The love of Nature, which is very generally implanted in the Swedish nation, finds expression in the very prevalent custom of spending the summer in the country, as testified by the great number of *Summer-Villas* to be found in the vicinity of the towns, especially of Stockholm, and which lend such attractiveness to its two »Skärgårds», both the outer one towards the Baltic and the inner one on the banks of the Eastern section of Lake Mälaren.

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4. THE SWEDISH LAPPS.

An account of the ethnological conditions of Sweden would be incomplete, if no attention were devoted also to the little congeries of Lapps living in the northern parts of the country. The total number of the Lapps in Sweden is only 7,000; their distribution has been shown above (p. 93); and here may be added the following short notices concerning their ethnographical origin, their customs, and their ways of living.

After the Snow-storm.
From a painting by JOHAN TIRÉN.

Just as the language of the Lapps belongs to the Ural-Altaic family, and shows similarity to the Indo-European tongue only in so far as it has borrowed various words from it during the course of centuries, thus also, the Lapps, or the *Same people*, have their closest relations in the northernmost parts of European or Asiatic Russia. Thus, among the Russian Tschouvassers, who live on the banks of the Wolga, between Kasan and Nischneij Novgorod, one often meets individuals whom even the most practised eye could mistake for genuine Lapps of the southern type (those found in Vesterbotten and Jemtland); and, among the northern Lapps, especially around the Enaretträsk and on Kola, one often finds a very strong likeness to the Samoyeds. The prevailingly brachycephalous skull-formation,

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the prominent cheek-bones, the slender figure and comparatively small stature, etc. are well-known anthropological features, which, however, are often much modified. The Lapps are not so short as it appears at first sight, from their not wearing heeled shoes. As to their mental culture and intelligence, they undoubtedly rank highest among all primitive peoples. Among the younger generation there are hardly to be found any individuals who cannot read and write; and among the older, such as cannot read are exceedingly rare. They have a quick perception, and they are good-natured, though quite suspicious as regards people of other races than their own. They are not more superstitious than peasantry generally, and, as a rule, they are honest, moral, and religiously inclined. No Shamanism exists in Swedish Lappland any more. The strong love of liquor, for which the Lapps are known, is now, in most of their communities, so much diminished that, even in this respect. the Lapps cannot be considered more degenerated than their neighbours. Morally, the most northern Swedish Lapps (in both of the northernmost parishes) are considered to rank lower than the southern Lapps, while, on the other hand, they are more industrious and more scrupulous in their care of the reindeer.

The typical Lapp is a nomad, the reindeer being everything to him. So it has been in all times, as far back as ethnical research has been able to penetrate. No wonder then that all the visible ethnographical features of the Lapps have been developed to the utmost practical perfection as regards their ways of living and with reference to the surrounding climate and nature. The **Fjäll Lapps** live in a kind of tent (*kåta* or kåte) which by all experts is recognized to be of the most practical type. In it every post, every place has its name and its purpose, although to the superficial observer everything appears chaotic. The *turf* or *bark hut* is inhabited by the comparatively more stationary **Fisher Lapps.** In the greater part of Swedish Lappland it is conical, and, where practical, modeled on the tent; but in the northernmost parts of the country it receives a more or less distinct spherical form, and is very much like the purely high-arctic mud or *snow hut.*

The costume of the Lapps varies considerably, as regards more unimportant ornaments and fashions, making it easy for an expert to determine to which community a Lapp belongs, but the practical frock, the beaked shoes, and some such things are always characteristic of their outfit. Their shoes may be called the *arctic foot-wear*, which, in contrast to the sandal and its descendants, must have originated through the necessity of protecting the foot against cold instead of heat.

Ethnological researches have refuted the old theory that the Lapps formerly inhabited the whole of Sweden. Broadly speaking, they are not considered to have ever spread farther towards the south than now, though in former times quite a number of Lapps frequently extended their more temporary migrations far down towards Southern Sweden, and individual Lapps roamed in these regions far more than they do now. Statistical information regarding this people is generally doubtful and of difficult interpretation. But considering how many prosperous tribes have died out within one generation, in all of the Lapp communities, and the persecution and disastrous diseases which in several places have decimated the reindeer herds, it is hard to see the future of the Lapps in an especially bright colour. And yet the case does not appear hopeless. This hardy and morally strong people has passed triumphantly through even more severe struggles.

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III.

CONSTITUTION AND ADMINISTRATION.

The government of Sweden has from times immemorial, as far back as written history reaches, been **monarchical,** and the head of the State has always had the title of *King.* Since the union with Norway (1814) the official title of the King is: King of Sweden, Norway, Gothia, and Venden. The name of Gothia in this connection denotes Götaland or Southern Sweden in contrast to Svealand or Central (and Northern) Sweden, which latter of old was designated in the royal title by the name of Sweden. Owing to the last mentioned circumstance, Svealand is often in foreign handbooks called Sweden proper, which, however, in our days is utterly erroneous. — As to the title »King of Venden», it refers to those days when Sweden had possessions beyond the Baltic.

The Swedish *Royal Arms* consist of a quartered escutcheon, overlaid with a cross of gold, and an escutcheon of pretence carrying the coat of the Royal Bernadotte family. In the first and fourth quarters are seen three golden crowns on a blue ground (called the arms of Svealand); and in the second and third quarters, golden lions rampant over three bands (called the arms of Götaland); the upper part of the escutcheon carries a royal crown. As supporters stand two golden lions rampant regardant. The mantle is a purple one lined with ermine.

In the armorial bearings representing the *Swedish-Norwegian Union,* the dexter side of the shield (above described as first and third quarters) is occupied by the Swedish coat of arms, whereas the sinister side shows the Norwegian coat of arms (a golden lion rampant with a battleaxe in its paws) — the whole on a scarlet ground.

The Swedish *flag* is blue with a yellow cross. In the left upper corner is seen the so-called union, in which the Swedish colours are combined with those of Norway (red, white, and blue). The Swedish naval flag is split in three points; the civil government office one, in two; but the trading flag is rectangular.

The Swedish *orders of Knighthood* are five in number, viz., the orders of the Seraphim, of the Sword, and of the Northern Star, since 1748; that of Vasa, since 1772, and of Charles XIII (for freemasons), since 1811.

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1. CONSTITUTION.

As has been already shown, Sweden had been inhabited, for a considerable period prior to the birth of Christ, by a Germanic people; indeed, the modern theories assume that the population of the country even in the Stone Age was of the same origin. Though bodies of immigrants may subsequently, from time to time, have found their way into the country, yet no invasions or conquests at all comparable to those of the great Gothic migrations in Central and Southern Europe took place here, and the remote situation of the land geographically kept it aloof from those influences that were shaping and organizing the fabric of society in the rest of Europe during the middle ages properly so called. Thus it came about that an entirely individual organization of society, based on the conceptions of the early Germanic races, established itself in Sweden.

The Royal Palace, Stockholm. Photo. Fr. G. Klemming, Stockholm.

By the time, however, when information as to the state of things in the country begins to be rather less sparse, the oldest phase of that social organization had already all but passed away. Doubtless, here as well as among other Germanic nations, numerous independent minor kingdoms or *fylken*, existed side by side, and we have the authority of tradition for believing the *kingly dignity* to have been a primeval institution. Actually, before the commencement, however,

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of historic times, in the usual acceptation of that expression, these minor kingdoms had become united under the suzerainty of the King of Uppsala, who in addition to his temporal authority was likewise caretaker of a far-famed Temple of the Gods. The dominion of this monarch was, however, for a lengthy period little better than one in name; for the different sections or provinces of the country retained a large measure of independence. At their head there was at a later period a »man of folk-law» (*Lagman*) who represented them; they possessed laws of their own, settled their own concerns independently in their own courts and assemblies (*Ting*), and the people of another province were in certain respects treated as strangers. There were really but two classes of society in these provinces: freemen and thralls (the latter almost exclusively consisting of prisoners of war); a class of nobility endowed with special privileges was not known. The oldest form of monarchy, here as in other Germanic communities, was based on a *combination of the hereditary and the elective principles.* The new monarch was, as a rule, a member of the same family as the late one, but not necessarily the next of kin and occasionally not even related to him.

Christianity was introduced but slowly into the country, and was the cause of strife during the course of the 12th century between those parts of the country that had already embraced it and those that still adhered to paganism; this strife soon centered round the right to choose the King, and therewith the very existence of the kingdom as a whole was threatened. In religious matters, however, unity was established by the institution of an archbishop for the whole country, in 1164, and shortly afterwards accounts speak of one King only, though the integrity of the kingdom was still, and for some time to come, anything but firm, and the elective principle was still acknowledged.

While monarchy in Central Europe had to contend in the middle of the 13th century against dissolution at the hands of feudalism, it had in Sweden to combat with the tendencies towards a break up into provinces. At that time, however, there was a succession of vigorous regents of the Folkungar Line who embraced the conception of centralization and were wise in collecting around them the leaders in the kingdom, both in temporal and spiritual concerns. As a result we can discern a great increase in the power of the monarch, but at the same time there comes into existence, at his side, a Council forming a species of representation of the kingdom, called the Royal Council or the *Council of the Realm* (Konungens or Rikets Råd), constituted by the leading men above spoken of. Contemporaneously with their accession to a share in the government, commences national legislation, resulting, in the middle of the 14th century, in a body of laws for the whole country, which in the section entitled: »Konungabalken», or Section of King, touch upon the constitution of the State. The 13th century was, moreover, a period of far-reaching social changes and of the rise of the four Estates of the Realm; of these facts mention has already been made in a preceding section of this work.

To the introduction of the Estates of the Realm succeeded a period of internal confusion. The feudal system was never actually adopted, though tendencies in that direction may be observed; in any case, »the great men» began to show signs of overtopping the monarch, and his position was not such that he could check them. Thereupon came a break in the evolution of the nation in the shape of the *Union between Sweden, Denmark, and Norway* (in 1397); during that period the interests of Sweden were slighted by the regents of the three united countries, and at intervals the country was left without a government at all. This produced a vigorous national movement in the early part of the 15th century (1434) that was specially characterized by the part taken in it by the rural population (the small freeholders, peasants) under the instigation of the gentry class. At the same time and while other forms of re-

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presentation (the Council of lords spiritual and temporal, assemblies of nobility) still existed, there were general assemblies organized, to which representatives of the cities as well as of the peasantry were invited, and thus the *Swedish Diet* (**Riksdag**) began to acquire a more permanent shape.

To defend itself from the evil effects of the union, the nation placed for long periods a *Protector of the Realm* (Riksföreståndare) at the head of the government. This confused state of affairs, however, rendered all steady progress in the realizing of a workable organization of the body politic impossible. At the close of the middle ages, matters stood about where they were at the beginning of the 14th century in this regard.

At length, the union with Denmark was for ever brought to an end by the appearance of *Gustavus Vasa* (1523/60) on the scene. Now, a powerful King once more made himself and his sway felt, the Catholic church was owerthrown, and the new Protestant religion was established under the authority of the King, the independence of the provinces was destroyed, hereditary succession to the crown was introduced (1544), and the unity of the State as such became a reality. The Kings of the Vasa Line completely organized the administration of the State, crowned and ratified after Gustavus Adolphus' death by the *Constitution Act of 1634*. The Council of the Realm was transformed into a permanent chamber of councilors, a *Senate* in the capital, and became more and more distinct from the *Riksdag*. The latter, again, developed into an independent organ of government in the reorganized and united body politic. Though for a long time it was only summoned to meet on specially momentous occasions, it was nevertheless a cooperating agent, during the internal struggles at the close of the sixteenth century, in all the important alterations inaugurated then in the status of the realm; it began to share, too, with the King in the legislation, and assumed from the other forms of representation and the provincial assemblies — these now vanishing — the right of decreeing taxes. The *first Organic Law for the Riksdag* dates from 1617. The Riksdag was constituted by the Estates of the Realm, from this time forth four in number. These were: the *Nobility* including both the higher and lower orders — the nobility proper and the gentry — and forming the House of Knights (Riddarhuset), in which all noble families had a right to be represented, and where, moreover, representatives of the officers in the army had seats; the *Clergy;* the *Burgesses;* and the *Peasantry*, the three last consisting of delegates for the Church, the Towns, and the Peasant Landed Proprietors. The Protestant Clergy, thanks to the prominent part they had played in the internal struggles at the close of the 16th century, had acquired very considerable influence as the upholders of intellectual culture and alone constituted one of the four Chambers of the Riksdag.

Matters did not proceed, however, in an even course of normal development during the whole of the 17th century, for two regencies, extending together over almost a quarter of a century, involved interruptions that brought with them a degree of irregularity and discontinuity as regarded the external forms of government; contemporaneously, too, arose strife of parties between the Estates. These contentions lasted for upwards of thirty years (1650/82) and concluded with a partial victory for the lower Estates. At a time of great financial embarassment for the Crown, an Act of resumption was forced through the Riksdag in the reign of Charles XI, by which all grants from the Royal Estate were annulled, especially the great fiefs of Counts and Barons. This victory for the lower Estates was obtained, however, at a high price, for at the same time devolved into the King's hands *absolute power*. The Riksdag was summoned to meet, it is true, at intervals, but only for the purpose of giving assent to the King's proposals, and Charles XII (reigning 1697/1718) ruled without a parliament, exercising in his own person the rights of legislating and of taxing.

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On the death of Charles XII, the period of Sweden's greatness as a political power came to an end, and a considerable share of the blame for the misfortunes that had brought the country to the verge of ruin was attributed in Sweden to the absolute monarch. To a very essential extent it was owing to the *Estates of the Realm* that the restoration of the kingdom both in internal and in external relations was effected. Without disturbing the foundations of the old fabric of the State, which the King, the Council, and the Estates were considered to constitute, the last-named endeavoured, merely by transposing the preponderance of power and by other precautionary measures, to provide against a recurrence of the abuse of the royal prerogatives. The King was still at the head of the government, but he was not expected to issue decrees on his own judgment alone, but to take and adopt good counsel. It was thought that this would be ensured by the ordinance that, in case of vacancy in the Council of Realm the Estates were to propose a list of candidates, from which the King had to choose one, and that all important matters were to be decided by voting in the Council, at which the King should have two votes besides a casting one. The Council was, moreover, to be held responsible to the Estates. The King was not actually deprived of a share in the legislation, but he was constrained to promise always to abide by the decision of the Estates of the Realm, which consequently in actual fact became legislative bodies. They decided on the budget estimates, moreover, and naturally exercised the right of taxation. By the ordinance that they were to meet at stated times, provision was made that their influence should not be circumvented. Finally, the Estates became the highest court of appeal in practically all questions, owing to the ordinances that any one should be permitted to lodge a complaint with them if he considered that he had been wronged and could not obtain redress by other means, and that the Estates had the right to examine into the administrative government in all its branches and, in case of need, set matters to rights. Comprehensive stipulations were made for the organization of the mode of procedure in the Riksdag in the *Constitution Acts of 1719 and 1720* and in the *Organic Law for the Diet of the year 1723*.

The Constitution of the State during the »*Period of Liberty*« (1718/72) is an interesting study from its being the result of an attempt to arrive at parliamentary constitution; it is, moreover, one of the earliest attempts of its kind in the history of modern times. The legislators, however, had by no means a clear conception of constitutional monarchy and its character. They dealt chiefly with time-honoured Swedish forms and ideas of government, endeavouring to get them to suit what were known to be the needs of the moment. The whole reform wears the aspect of a reaction against the excesses of an earlier period, excesses that had entirely broken the normal course of previous development. This being so, explains the excess of which they on their side, as so often happens, were guilty in response, in this case, though, of a more serious kind, since it was defined with the utmost possible precision in set terms. *Royalty* had been stripped, in so many words, of well-nigh all its prerogatives and was treated with a suspiciousness that knew no bounds; in the so-called *Royal Declarations*, moreover, a further means had been devised for fettering the hands of a new King. It was natural that the occupants of the royal dignity became discontented with this condition of things, and were liable to intrigue against this form of government. The *Ministry* (The Council of the Realm) soon acquired the character of a proxy of the Estates, taking its orders from them. Under favourable circumstances, it is true, it could exercise a leading part, but towards the end of the period it lacked the power of doing so entirely. The modern conception of a ministry, moreover, was so far from people's minds at that day that the Council was considered to be permanently appointed, unless its members were expressly removed from their posts by the Estates. As the party system came into vogue, the as-

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sumption of power by one party involved, it is true, a change in the composition of the Council, but when that took place, it came as a species of punishment and political persecution.

The Estates had come into power, and it would have been strange if they had not exceeded the very lax bounds the fundamental laws prescribed for them; they soon interfered in the administration, both of justice and of the State, in a manner that imperiled the rights and security even of individuals. This extension of their influence became specially calamitous in the sphere of foreign politics, that now began to depend solely upon the prevailing majority in the Riksdag. The four-chamber system was retained, but it was this very system, together with the great numerical strength of the Chamber of the Nobility (at times numbering upwards of 1,000) and the ignorance of the members of the Chamber of the Peasantry, that brought about that almost all affairs of any importance were entrusted to a *Secret Committee* (consisting of 100 delegates of the three higher Estates) for settlement. Inasmuch as this body conducted its business under the protection afforded by strict secrecy, it exceeded its authority in manifold ways with perfect impunity for a considerable length of time.

The constitution, as existing in this period, afforded ample opportunity for the rise of a political literature. Especially was this the case when the course of development began to deviate; one party was anxious to support the system, the other to combat it. Out of this struggle emerged plainly the expressed doctrine of a constitutional monarchy, with a partition of power between King and Diet.

It was, however, not to be their lot, to effect a change in the constitution of the State; the rupture came from another quarter. The Diet was one of Estates, and among the Estates unity did not prevail. The nobility laid claim to the high offices of State, were alone in possessing the right to own privileged landed property, and endeavoured also, at one time, to form themselves into a close order by preventing the ennobling of any other families. The offices enticed the unprivileged middle classes, while the peasants were only able to possess land encumbered by land-taxes and had not, in all cases, full freedom in the managing of it. A chance circumstance kindled the flames of war of the Estates; the privileges of the nobility were attacked in numbers of pamphlets, and far-reaching demands for social and political equality were put forth. The privileges of the nobility were threatened, and, the integrity of the kingdom being also in danger, by reason of the corruption in the ruling party and its intrigues with Russia, Gustavus III embarked, with the aid of the nobility, in his famous *Revolution*, in the year 1772.

The constitution was re-established by a new *act.* The King had his independent position as head of the State restored to him, and a division of power was partially introduced, inasmuch as the united sanction of King and Diet were made requisite for the enactment of laws. But the assembling of the Diet now depended upon the King's will, and the ministers (*Councilors of the Realm*, Riksråd) were not responsible to the Riksdag; that body had, certainly, the right of taxation, but lacked all means of exercising effective control on the expenditure of public money. The constitutional element in the new fabric of state was consequently more pretended than real. It was soon evident that the King was trying, by every means in his power, to counteract the activity of the Riksdag and to interpret to his own advantage the ambiguous expressions that the fundamental law contained in large numbers. Strong disapproval of this conduct being shown, the king in reply embarked in the war with Russia. Thereupon, discontent broke out openly in the form of the Anjala mutiny, led by officers of noble birth. Availing himself very cleverly of the strife between the Estates, which recommenced as a consequence of that rising, Gustavus III carried out a new Revolution (1789), and

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by a new clause to the Constitution Act, called the *Act of Union and Security* (Förenings- och säkerhetsakten) he obtained for himself complete liberty in the government of the kingdom, the right to declare war, etc. The power of the Riksdag was further restricted, the time-honoured Council of the Realm was dissolved, and the King sought counsel of a ministry appointed in a somewhat arbitrary fashion. For the administration of justice in its higher branches, a special High Court of Justice was instituted; and for the administration of the *National Debt*, a special *board* was appointed under the direction of the Estates. The distinctions between the nobility and the other Estates were to some extend expunged. Commoners were allowed to hold most of the offices of State, and the position of the peasantry as a class was materially improved. The form of government had, however, once more approximated to that of absolutism.

Gustavus IV Adolphus (1792/1809) proved incapable of taking advantage of the vast power placed in his hands by law, and having brought the country almost to the verge of ruin by his insanity and having been consequently dethroned (March 13, 1809), the Estates of the Realm met in assembly and had the solution of a difficulty thrust upon them, resembling that presented to their predecessors on the death of Charles XII. The task they had to perform was the forming of the constitution of the country anew: that it required reforming, therein all agreed.

The Resolutions passed by the Riksdag in 1809 inaugurated the polity in Sweden that still holds. In framing its provisions, advantage could be taken of the very great experience, drawn from the varying constitutional experiments during the foregoing centuries, and the framers showed that they were fully able to cope with the task set before them. They were careful to strike a moderate middle course, avoided bestowing a preponderance of scope to either autocracy or oligarchy, and laid a firm constitutional basis in the truest sense of that expression. Moreover, with the exception of the stipulations regarding the composition of the Riksdag, no radical changes have since been made in the constitutional fabric then bestowed upon Sweden.

In unison with time-honoured custom, the regulations were drawn up in three divisions — the three fundamental laws: the *Constitution Act* (Regeringsformen), of June 6, 1809, now the oldest written fundamental law in force in Europe, the Organic Law for the Riksdag (Riksdagsordningen), 1810, and the Act of Settlement (Successionsordningen) 1809; of these, the former is expressly stated to be the principal one. A fourth fundamental law was adopted in 1810: the *Law on the Liberty of the Press* (Tryckfrihetsförordningen). The last-named was replaced by a revised act on July 16, 1812, a new *Act of Settlement* had to be adopted on September 26, 1810, and the *Organic Law for the Riksdag* of 1810 was rendered null by the new one of June 22, 1866. The constitution act still retains its old date, though it has undergone numerous modifications in matters of detail.

The Act of Settlement of 1810 regulates the rights of hereditary possession of the Swedish Crown within the family of Prince Johan Baptist Julius of Ponte Corvo. The hereditary principle is established in the male line. The King, who comes of age at 18, shall be an adherent

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of the Lutheran Confession. The right of succession is forfeited if, for instance, a prince marries withouth the king's consent, or if he weds a private man's daughter. The sceptre of government can only be wielded by the King when in Sweden, or — since 1815 — within the bounds of the two united kingdoms, Sweden and Norway. When he is beyond those boundaries, a regency must be appointed, unless the King be absent in the event of war.

The Constitution Act of 1809 seeks to shield the prerogatives of **Government,** but at the same time to prevent their abuse. The King has the right to »govern the kingdom alone», but he shall take his decisions in the *Cabinet* (Statsrådet) after having heard the advice of the Ministers, the adviser's counsel being entered on the minutes.

The Council Chamber, Royal Palace, Stockholm.

The Cabinet Councilors, who shall be natural-born Swedes and adherents of the Lutheran Confession, are appointed and dismissed by the King, but are responsible to the Riksdag. Since 1876, one of the members of the Cabinet is *Prime Minister*. Eight of the Ministers are heads of departments and introduce matters belonging to their respective departments to the King in Cabinet.[1] The King holds the council in his own person and comes to a decision after the matter has been set forth by the Councilor charged with it. The Cabinet Councilors, as a rule, are not permitted to come to a decision themselves, and even most insignificant matters are brought under the King's immediate notice. The King signs the resolutions, but these have no legal force unless they are countersigned by the minister who brought them forward, and it is his duty and right to refuse to thus countersign the resolutions, if they are at variance with the stipulations of the Constitution Act.

The King appoints the majority of the public officials with the exception of the lowest grades. But all judges and most of the officials are undismissible, unless after a judicial enquiry and sentence against them. The cabinet ministers, the heads of institutions, civil and military, diplomatists together with a number of other officials specially mentioned, are the only ones whom the King can dismiss,

[1] The eighth department (that of agriculture) was introduced in 1900. Up to that year (since 1840) the members of the council were ten in number.

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should he find such a course desirable for the welfare of the kingdom. Of this right the Government makes very exceptional use — often not in one case in the space of a whole decade.

The King of Sweden is the supreme judge according to a theory that dates far back into the past: his functions as such are, however, conferred upon the *High Court of Justice* (Högsta Domstolen). Only in case the King is present, which as a rule does not occur, does he possess two votes in addition to a casting one. In cases of law interpretation, the two votes of the King are always asked for. The King has the right to pardon. — The right of bestowing the dignities of nobility is one of the prerogatives of the King. The right is, however, but seldom excercised nowadays — only in five cases since 1865.

The King shares the legislative authority with the Riksdag, he possesses the right of absolute veto, which, however, is very seldom exercised. The King has, moreover, one sphere of legislation of his own — the so-called *Administrative and Economic Legislation* — embracing not merely instructions or regulations for public offices and institutions, but also laws referring, within certain bounds defined by usual practice, to the public economy and to industries.

The four-chamber system in the **Riksdag** was retained in 1809. Its defects were, it is true, clearly seen, but at the critical juncture in which the country then was, the complex problem of fixing a fresh basis of representation was too venturesome a task to be attempted. The matter was thus for the time left, and from 1830 onwards it was repeatedly brought up and discussed. In 1848, Government brought in a bill for reforming the representation, but it was rejected by the subsequent Riksdag. After another decade had passed, the question was raised again, and, in 1862, the Cabinet, whose most prominent member was Baron *Louis De Geer*, formulated a new proposal, which was at length definitely adopted in December 1865, whereupon in the next year (June 22, 1866) a new Organic Law for the Riksdag came into force.

The *composition* and *methods of working* of the Diet, as regulated by the new law, will be discussed at more length subsequently. Here it may suffice to mention that it consists of *two chambers*, both constituted by general elections without regard to station or profession. According to the fundamental laws of 1809, the Riksdag was to meet every fifth year, a regulation that was altered by the Riksdag of 1844/45 to every third year. The new law stipulates that the Riksdag should assemble *every year*. No *direct* change was made in the powers of the Riksdag by the alteration in its composition of 1866.

In case of need, the Riksdag has the functions of choosing a King, an heir to the throne, and a regent. It also shares the legislative authority with the King. Here it must be noted that *alterations in the fundamental laws* may be rejected at once, but can only be accepted in such wise that they are declared to stand over until the first session of the Riksdag after a new election has been held for the second

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chamber, when they shall either be adopted unamended, or rejected. *Other legislative bills* can be decided in the same session in which they are brought forward. With regard to changes in the ecclesiastical law, the Synod has the right of veto. The legislative power of the Riksdag embraces the following: Fundamental Law, Civil and Criminal Law, Communal Law, Ecclesiastical Law, and the Criminal Law as applied to the Army. In regard to the so-called »Administrative and Economic Legislation» (see above), the Riksdag can only address its desires to the King. The Government, however, as a rule, inform themselves as to the opinion of the Riksdag on all important questions of this nature, and it is also often the case that the King invites the Riksdag to unite with him in legislating on them.

The power of the Riksdag is more comprehensive with regard to the *determination of the estimates.* The main proposition emanates from the Government, and the Riksdag does not, as a rule, vote »ordinary» (i. e. annual) grants, unless the proposition comes from that quarter. The budget estimates are considered in detail by the Riksdag, and a definite sum is, as far as possible, voted for each item, and it must not be exceeded. Only in the event of money having been saved, the Government has the power, in certain cases, of using it for purposes of a kindred nature within the compass of the department where such saving has been made. In case the chambers have arrived at different conclusions respecting a grant, a new vote is taken of both the chambers together. In other cases, these have the power of veto over each other.

The Riksdag alone has the power of decision respecting the negotiating of loans which is effectuated by a *National Debt Board* (Riksgäldskontoret) chosen by the parliament — a custom dating from 1789. Of old, the Riksdag guaranteed the solidity and conducted the administration of the *Bank of Sweden* (Riksbanken); in conjunction, however, with its prospective assumption of the sole right of issuing notes, the King obtained, in 1898, the right of appointing the chairman of the administrators of the bank and of sharing in bank legislation. The Riksdag determines the principles upon which the *Demesnes of the Crown* shall be administered and also those of the *Coinage;* in both cases it has obtained a prerogative formerly belonging to the Crown.

The control of the Riksdag over the disposition of public money according to the Budget Estimates, is rendered effective by the right it has enjoyed since 1809 to look through, in the persons of the **Auditors** it appoints, the accounts of all public institutions. These Auditors now meet annually, have access to all the accounts and institutions belonging to the State, and are expected specially to examine whether the resolutions of the Riksdag in regard to the disposition of public money have been observed; these officials have, moreover, commenced to express opinions with regard to the administration of the State in general and to the advantageousness, or the reverse, of its modes of procedure, etc.

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The Riksdag also exercises control over judges, officials, and civil servants, through a special law officer, who is chosen annually, the **Solicitor General of the Riksdag** (Justitieombudsman). It is his business, not only to watch over the manner in which the law is administered and to propose measures for improvement therein, but also to provide against judges and public officials infringing upon the rights of private individuals. If he is of opinion that such has been the case, it is incumbent upon him to summon the person in question before a court to have the matter judicially sifted. Private individuals, too, have the right of laying their case before the »Justitieombudsman», if they consider that they have been treated unjustly at the hands of a judge or a public official.

Furthermore, the Cabinet Ministers are responsible for the discharge of their duties to the Riksdag. The forms for the exactment of this responsibility are detailed at great length in the Constitution Act, and an account of them will be given below, but they have now in part become obsolete. Actually, the *parliamentary* form of government has gradually come to prevail in Sweden as elsewhere, and no government at the present day can subsist unless it enjoy the confidence of the Riksdag. Especially in regard to the choice of the *Prime Minister*, has it become the rule to appoint a representative of those political opinions to which, at the time, the majority in the two chambers of the Riksdag adhere.

The prescribed forms in the Constitution Act concerning the *responsibility of ministers* are as follows. During the progress of each session of the Riksdag, the minutes of cabinet proceedings are handed over to a special committee of the Riksdag, the Constitution Committee, which has to report to the Riksdag after a perusal of the same. If now the committee discover that any of the King's advisers has not discharged the duties of his office »with zeal, impartiality, and ability», the committee does notify the fact to the Riksdag, who in its turn can demand of the King his dismissal. This demand, however, the King is free to disregard if he so deem. If, again, the committee discover that any of the King's advisers has acted at variance with the fundamental laws of the realm, or with the public law, or has abetted infringement of the same, or omitted to make remonstrances against such infringement, or has countersigned, in his capacity as head of his department, any resolution at variance with the Constitution Act — the committee shall summon him before a *Court of impeachment* (Riksrätt). The composition of this court is fixed in advance and is of a very peculiar character, inasmuch as a number of public officials of high station constitute it. — Of all these obsolete regulations, the only one that really can be said to survive is the perusal of the minutes of the cabinet proceedings, whereby an exceedingly effective control is undoubtedly exercised upon the conduct of government business. In cases where serious comments are made — a thing that, however, has very rarely occurred in recent times — the minister so attacked will sometimes resign of his own accord. The other measures, as above related, have not been put in practice for several decades.

The members of the *High Court of Justice* are also in a certain and pretty peculiar manner responsible to the Riksdag, which possesses the right of determining by means of a special committee, called the Committee of Opinion (Opinions-

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nämnden), whether or no the members of that Court are deserving to be kept in their offices. The committee does not institute any investigation, is not indeed at liberty to enter upon any discussion: its only function is to express its opinion by a vote. Any member of the High Court of Justice who is removed by this process, is entitled to a pension amounting to half the salary he was before in receipt of. No one was ever deposed in that manner, though. The Riksdag has yet another form of control over the High Court of Justice in the fact that the Justitieombudsman (see above) may charge a member of the Court before the Court of Impeachment (see above) for flagrant misdemeanour as a judge.

The Swedish constitution is the only one in Europe, with the exception of that of England, which has without greater interruptions been evolved by a process of independent political growth on a national foundation. This is sufficient to explain its many peculiar features, of which the most conspicuous have been roughly sketched above. The constitution that Sweden possesses affords as a whole a faithful picture of the conceptions of justice that prevail in the minds of its people, whose maturity in political matters is thereby fully evidenced.

The composition of the Riksdag and its method of working.

In accordance with the new Organic Law of 1866, the Riksdag shall consist of **two chambers,** which »in all questions have equal competence and authority». Since, however, financial questions are decided by the common revoting of both chambers, in case they have separately come to a different decision, the Second Chamber has, on account of its numerousness exceeding that of the other chamber by more than a half, a somewhat greater influence than the First Chamber in this respect, which corresponds to the state of things not uncommon in other countries, namely that the Second Chamber possesses rights of preference in regard to budget questions. The manner, in which each chamber is constituted, is as follows.

The First Chamber consists of 150 members, who are elected for a term of nine years by the County Councils (Landsting) of the respective läns, as well as by the Town Councils of the five towns of Stockholm, Gothenburg, Malmö, Norrköping, and Gefle, which are not represented in the County Councils. The memberships of the First Chamber are distributed between the different constituencies in proportion to their population, which distribution is regulated every tenth year.

The accompanying regulations in regard to the number of members were established in 1894. According to the Law of 1866, the number was fixed at one for every full thirty thousand of the population of the constituency. The whole number amounted, on this basis, to 125 in 1867 and to 148 in 1894.

The *provincial* and *municipal representative bodies*, which elect the members of the First Chamber, are, in their turn, constituted by public election, but with a certain census for the elective franchise, and with

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a »graduated voting scale» for the election itself, i. e. the number of votes depends upon the amount at which every voter is taxed (see under Municipal Administration here below).

For *eligibility* to membership in the First Chamber, the candidate must be 35 years old, and must own and, for at least three years, have owned real estate appraised at a minimum of 80,000 kronor, or must pay taxes and, for at least three years, have paid taxes on an annual income of at least 4,000 kronor.[1] As, however, the members of this chamber do not enjoy any salary, it is practically necessary that the candidate has a much higher degree of opulence than that here stipulated, in order that a person may be able to accept this office, at all events if he is not domiciled in the Capital. This circumstance causes the more remote Läns frequently to take their representatives for the First Chamber from Stockholm, but, in that case, preferably such as are natives of the constituency in question or have for some time had their occupation there. — The members of the First Chamber are elected for a term of nine years, reckoned in every case from the election-day. Thus the members of the Chamber are replaced successively, unless it be dissolved by the government, which has hitherto not occurred.

The constituting of the **Second Chamber** is based on a radical distinction between *country and town*. The whole number of members is 230, of whom 150 are taken from the country and 80 from the towns.

The number of *constituencies* is at the present 196, of which the 150 in the country each elect one representative. Of the 46 town constituencies, 41 elect each its representative, while the towns of Gefle and Norrköping each elect 2, Malmö 4, Gothenburg 9, and Stockholm 22. The election of more than one representative takes place by means of list-ballots, but in Stockholm, the city is divided into five districts or wards, each electing four or five representatives.

The Organic Law of 1866 really contained quite different stipulations to those cited above, which have been in force only since 1894. According to the law of 1866, in the *country* every judicial district (domsaga) should elect a representative; and if the district had more than 40,000 inhabitants, it was divided into two constituencies. The largest *towns* (with more than 10,000 inhab.) had a right to elect one representative for each full ten thousand of the inhabitants; the smaller towns were grouped together in constituencies of at least 6,000 and at the most 12,000 inhabitants each. *In fact*, the country in this manner was given *one* representative for about 27,000 inhabitants, while the towns were given *one* for about 10,000, which peculiar circumstance is explained by the need of a certain protection for the interests of the towns, which would otherwise have remained in a very marked minority, since their inhabitants in 1866 numbered only 12 % of the total population of the kingdom.

[1] A krona (plur. kronor) corresponds to 1·10 shilling or 0·268 dollar.

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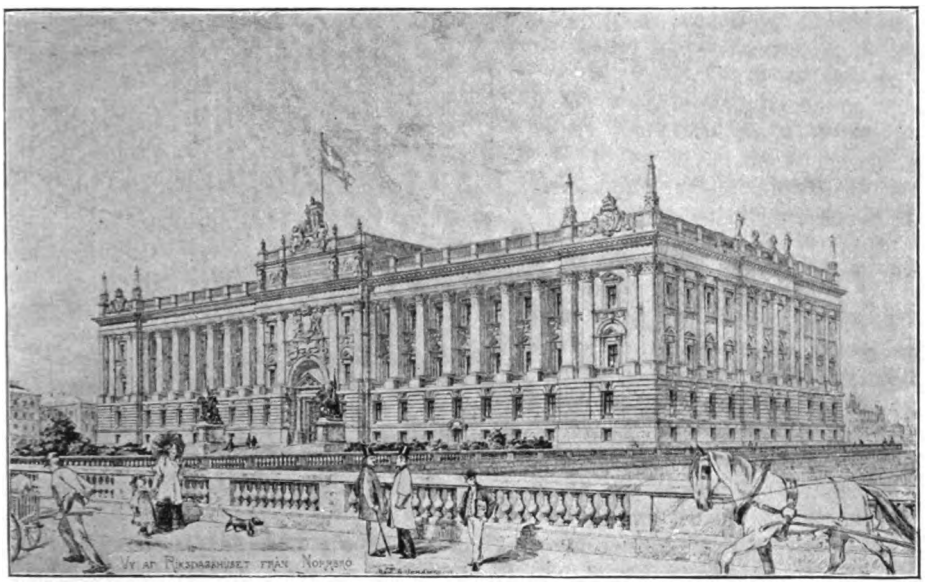
In this manner, the country had, at the Riksdag of 1867, 135 representatives, and at that of 1894, 145. The representatives of the towns, on the other hand, grew, on account of the rapid increase of population, during the same period of time from 55 to 83. To check this inequality, the majority in the Riksdag of 1894 succeeded in carrying the new regulations above cited, according to which the number of members is now *fixed*, namely to 150 for the country and 80 for the towns. When the population of the towns has reached $^{80}/_{230}$ of the population of the whole kingdom, however, the number will from thenceforth be re-regulated on the principle of *equal* representative rights for country and town.



The New House of Parliament.
Now (1902) nearing completion.

The constituencies in the country still consist of the judicial districts (the »Domsagor»), with a division into two sections of the 32 most populous ones, so that the stipulated number of 150 constituencies may be reached. A town which has at least $^1/_{80}$ of the total town-population of the kingdom, forms a constituency of its own, and elects one representative for every such full $^1/_{80}$; the smaller towns are grouped together to the number of constituencies needed in order to give, in all, 80 representatives for the towns. The re-regulating of the constituencies takes place every tenth year.

For the *elective franchise* for the Second Chamber, the regulations of the law of 1866 are still in force. The conditions for this elective franchise (which is only applicable to men) are: Swedish citizenship, civil rights, majority (21 years), and either the possession of real estate with a value of at least 1,000 kronor, or a lease (at least for five years or for lifetime) on an agricultural estate with a value

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TABLE 31. *Elections to Lower House of the Riksdag 1872/99.*

Ordinary elections.	Population, end of previous year.		Entitled to vote[1].			Voting.	
	Total.	Men, 21/ω years.	Total.	% of popul.	% of men of age.	Total.	% of entitl. voters.
In 1872	4,204,177	1,093,711	236,120	5·62	21·59	45,198	19·1
» 1875	4,341,559	1,115,715	255,552	5·89	22·90	49,765	19·5
» 1878	4,484,542	1,162,046	270,337	6·03	23·26	54,821	20·3
» 1881	4,565,668	1,193,454	281,163	6·16	23·56	66,591	23·7
» 1884	4,603,595	1,209,071	291,668	6·34	24·12	73,636	25·2
» 1887[2]	4,717,189	1,253,164	278,039	5·89	22·19	99,870	35·9
» 1890	4,774,409	1,261,593	288,096	6·03	22·84	110,896	38·5
» 1893	4,806,865	1,259,224	298,810	6·22	23·73	126,691	42·4
» 1896	4,919,260	1,291,826	309,889	6·31	23·99	140,488	45·3
» 1899	5,062,918	1,340,709	339,876	6·71	25·35	136,982	40·3

of at least 6,000 kronor, or, finally, an income of at least 800 kronor per year. Furthermore, it is necessary not to be in debts for unpaid municipal taxes. The whole number of qualified voters amounted in 1899 to 340,000, or 25 % of the men having reached majority. It will be seen by Table 31 how this number has changed since 1872.

For *eligibility* to the Second Chamber, it is necessary to enjoy elective franchise, to be 25 years old, and to be *domiciled within the constituency*. The latter peculiar stipulation is an expression of the very developed aversion of the Swedes to so-called professional politicians. Since the members of the Second Chamber have a salary (1,200 kronor), it is not necessary to have a private fortune in order to be able to accept the office. — The elections are for a term of three years. If the Chamber is dissolved during the term (which has occurred only once, namely in 1887), the new elections hold good only for the remainder of the current three years' term. The ordinary election years are shown by the table.

The manner of election (direct or indirect election) is determined by every constituency separately, but cannot be altered until after the lapse of five years. At the present, direct election is used in 181 constituencies and indirect (through electors) only in 15, all constituencies of the latter kind being in the country. The election is in the towns presided over by the magistrates, in the country by the chairmen of the communal assemblies, who send in a report of the elections to the judge, that counts the votes and publishes the result. (In elections by electors, these are called together for voting by the judges.) Elections are carried on with closed ballots. Absolute majority is not required for the elected candidate; when the votes are equal on both

[1] Including those otherwise entitled to vote who were delinquent in taxes, the number of voters amounted for the year 1899 to 401,109, or 7·92 % of the entire population and 29·92 % of men of age. — [2] At the elections in March, 1887, after the dissolution of the House, the number of those entitled to vote was 274,733, and of actual voters 132,265, or 48·1 %.

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sides, decision is made by casting a lot. The regulations in regard to the carrying on of the election are rather brief when compared with those of several other countries. — *Public candidacy* is not prescribed, but it is coming more and more into use. *Contestable* elections are not decided by the Chambers themselves, but in the last instance by the High Court of justice.

Method of Working. The *regular* session of the Riksdag (lagtima riksdag) convenes every year on January 15, in Stockholm, and has a right to continue its session during four months, unless Government dissolves one or both of the Chambers and enjoins new elections. The four months' session is seldom exceeded. The Riksdag may be convened to *extraordinary* (urtima) session by Government during the vacations, but, in that case, the Riksdag is only obliged to treat of the subjects for which the session was convened.

The Speaker and the *vice-Speaker* (talman) in both Chambers are appointed by Government. The *right of introducing bills* is allotted to Government (whose bills are called »propositions», and enjoy certain rights of preference in the formal treatment), to every separate member of the Riksdag, and, in certain cases, also to Committees of the Riksdag.

For the preparation of the subjects, every regular Riksdag is to appoint **Committees,** namely, Constitution, Budget, Tax, Bank, and Law Committees. Of these, the *Constitution Committee* has to examine the minutes of the Cabinet and treat bills in regard to alterations of the constitutional laws, in which latter respect the Committee itself also has the right of introducing bills. The *Budget Committee*, which treats the majority of the financial questions, has through this function become the most important and most influential one. The *Tax Committee* occupies itself with questions concerning certain taxes, called »Bevillningar» (compare p. 208). The objects of the *Bank* and *Law Committees* are implied by their names. The number of members in the ordinary committees is 16 in either of the two last mentioned, 20 each in the Tax and Constitution Committees, and 24 in the Budget Committee — in every case half from each Chamber.

For the treatment of questions which come under the handling of the ordinary committee, the Riksdag may also appoint *Special Committees*, which often takes place in regard to subjects requiring a more exhaustive examination. For treatment of matters not belonging to the ordinary committees, each Chamber appoints for itself one or more *Select Committees*, as needed.

The Committees play an important part in the Riksdag, among other things by the personal co-working there coming about between the members of both Chambers — a peculiarity of the Swedish parliament.

The debates on the questions are, as far as possible, *simultaneous in both Chambers*, for which purpose the schedule of work is, in its main points, made up by the so-called Chairman-conference, which consists of the Speaker and vice Speaker, and three members from each Chamber. In *deliberations*, the Ministers of State are also allowed to partake (if they are members of the Chamber, they can also take part in the decisions, with a few exceptions). There are no special regulations intended to hinder so-called »obstruction», and they have hitherto never been found necessary. A *stenographic report* of the discussions is kept. The *manner of voting*, in case several different motions are made, shows formal peculiarities which are not to be seen in other countries. The voting is done with closed ballots where the decision is not made by acclamation.

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If the Chambers decide differently on any motion which belongs to the treatment of an Ordinary Committee, this body shall, if possible, make a project for a compromise. In order for a bill to be finally carried, it is necessary to have an *agreeing decision from both Chambers.* (The special order of action in changing the constitution is described in the foregoing, on page 176). *Financial questions* are regarded as exceptions to the rule that the consent of both Chambers is necessary, these questions being decided, in case of disagreement between the Chambers, by *united voting*, both Chambers voting anew and the result being determined by the united number of votes. This arrangement, which has its root in old Swedish Constitutions, has been of extraordinarily great practical importance, since it has counteracted the occurrence of constitutional strifes between the two Chambers.

If we cast a general glance over the *composition* of the Swedish Diet, there appear principally two peculiarities. The first is, as already pointed out, the great number of *peasants*, who have a seat there (over 100, principally in the Second Chamber). As a consequence of the traditions of centuries, our Riksdag peasants have become accustomed to appear in public, and have acquired a self-respect and a matter of fact knowledge, which causes them not to be inferior to the representatives of the higher classes of society or to the representatives of the people in any other country. — The other characteristic is the frequency in the Riksdag of State *officials*, — even such as can at any time be discharged by Government. It is not seldom that we see these officials in opposition to Government, without thereby running the least risk of losing their positions, — a speaking proof of the respect for independent conviction and of the moderation which constitute such a fine fruit of the far advanced parliamentary development in Sweden. Another fruit of these is the temperateness and moderation which characterize the discussions of the Riksdag, in proof whereof it may be sufficient to mention that, for more than thirty years, it has never occurred in the Riksdag that a member has been called to order, — much less that any member has been the object of the still sharper measures of correction which in certain parliaments are of almost daily occurrence.

The Union with Norway.

Since 1814, the Kingdom of Sweden, with its neighbouring country, Norway, constitutes a union, according to which the two kingdoms are united under *one* King in such a manner that they form a single whole in relation to foreign powers, whilst, in regard to internal affairs, each kingdom is on a footing of mutual independence. The King, therefore, bears the title of **King of Sweden and Norway;** but in documents regarding the *internal* affairs of Norway, the title is altered into King of Norway and Sweden.

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This union came about in the following way: The marshal Bernadotte, having been elected, in 1810, Heir of the Crown of Sweden, formed a scheme for uniting the whole Scandinavian peninsula under one monarch and thus securing its peace within and its independence without. By the Peace of Kiel, 1814, Norway, which, in 1536, became a dependency of the Danish realm, was ceded by the King of Denmark to the King of Sweden, not, however, to be incorporated with Sweden, but to form a kingdom united with the latter country. The Norwegians, who refused to comply with these decrees, chose a King of their own, viz. Prince Christian Frederick, their former Danish governor-general, and at a parliament, held at Eidsvold, adopted a constitution for themselves. This was followed by a short war between Sweden and Norway, a war that ended with the Convention of Moss on August 14th 1814, at which Christian Frederick undertook to abdicate the throne and leave the country, after having issued a writ to the Norwegian Parliament (Storting) to meet for the purpose of negotiating with the Commissioners of the Swedish King. The basis of these negotiations was understood to be the acceptance, on the part of the King, of the new Norwegian constitution, with only such modifications as would be the inevitable consequence of the union of the two kingdoms.

The negotiations between the Swedish Commissioners and the Norwegian Parliament resulted in Parliament consenting to the establishment of the Union, and an agreement was come to with the Commissioners as to the necessary alterations in the constitution, and King Charles XIII was elected and acknowledged King of Norway. After the Swedish Parliament had formally assented to those Union clauses introduced into the constitutional law of Norway, which occasioned a change in the government of Sweden, a special law in reference to this — the *Union Act* of Aug. 6, 1815 — was framed, which was passed by the parliaments of Sweden and Norway, and then ratified by their common King.

The Union Act of 1815 decrees that Norway shall be a free, autonomous, indivisible, and inalienable kingdom, united with Sweden under one King. Hence, the union is based upon the principle of each kingdom's mutual *independence.* The principle of equality between the two kingdoms is, indeed, not expressly mentioned in the Union Act, but is in most cases applied.

The Community between the two kingdoms comprises, as has been already mentioned, the *King* and the *Royal family* and the *relations with foreign powers.*

The community in respect to the King's authority also includes those who exercise it in the event of the King failing to attend to the duties of Government. If the King be sick or should happen to be beyond the limits of the united kingdoms, the Government of both countries is carried on by the *Heir Apparent* — if he is of age and not otherwise prevented — or else by a so-called *Interim Administration,* consisting of ten Swedish Cabinet Ministers and a similar number of Norwegian ones. If a Regency is required for a King under age, each parliament elects separately; and should no agreement be come to, then the question is to be settled by a *Delegacy* of 36 members from each kingdom, which Delegacy shall assemble in the town of Karlstad in Sweden. The same proceedings are to be taken at the election of a

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King, in case the Royal House dies out on the male line, or on the decease of the Crown Prince, if there be no prince left who is entitled to inherit. — With regard to the King's *residence*, this is assumed to be generally Stockholm, nevertheless the King is every year to spend some time at least, in Norway, unless prevented by essential obstacles. It is expressly decreed that the Interim Administration, when called into existence, shall have its seat in Stockholm. Three members of the Norwegian Cabinet are always in attendance on the King, one of whom has the position of »statsminister» (premier); another Norwegian State Minister presides over the State Council in Christiania.

Community *with regard to foreign powers* implies that peace and war, the diplomatic and consular bodies are in common, also treaties, for the most part, and other international conventions; certain treaties, however, which do not regard political matters, can be entered into by the King separately for each kingdom. As will be stated more fully below, all negotiations with foreign countries are conducted by the Swedish Minister for Foreign Affairs (inasmuch as Norway has no Foreign Office of her own). Ambassadors and consuls are the same for both countries, and these appointments are held by both Norwegians and Swedes, whereby it is customary for Norwegians to be employed in the Swedish Foreign Office. — On the 1st of January 1902, the officially appointed staff in the two services was constituted as follows: in legations, 23 Swedes and 8 Norwegians; in consulates, 15 Swedes and 18 Norwegians.

The *treatment* of affairs *connected with both kingdoms* is of two kinds, and depends on whether the matter be diplomatic or not. The procedure is different in each case.

Matters which do not fall under the heading of »diplomatic», when affecting both kingdoms, are settled in a so-called *Sammansatt statsråd* (United Council), in that, at discussion of such matters in the presence of the King in the Swedish Cabinet, the three Norwegian Cabinet Ministers who are in attendance on the King, have a deliberative vote there, and likewise three Swedish Cabinet Ministers in the Norwegian Cabinet when such matters are there discussed before the King. Decrees as to war or peace are to be made in the United Council, but this Council is then of a peculiar composition.

The transaction of *diplomatic* business (apart from decrees concerning war and peace) is not a function, as other government affairs, of the Council in full conclave, but is conducted before the King by the Minister of Foreign Affairs in the presence of two other Swedish Cabinet Ministers, as well as the Norwegian State Minister at Stockholm.

Apart from such business as we have now described as common to both, the kingdoms of Sweden and Norway are independent one of another. By consequence, the union is not a very comprehensive one,

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yet, nevertheless, there is no doubt of its being a real, and not merely a dynastic union. The Union cannot be dissolved by either of the parliaments alone, nor can the King abdicate the crown of one kingdom without also abdicating that of the other. For altering the Union Act, a decree of the parliaments of both kingdoms, together with the royal assent, are necessary.

To the civil list of the Royal Family Sweden at the present time contributes 1,420,000, and Norway 490,000 kronor per annum. Towards salaries for the Diplomatic Service of the two kingdoms (not including the Minister for Foreign Affairs, who is paid by Sweden alone), Sweden as a rule contributes $^{12}/_{17}$ and Norway $^{5}/_{17}$ (according to the Budget of 1899: 443,800 and 180,000 kronor respectively). For the Consular Service Sweden contributes $^{4}/_{7}$ and Norway $^{3}/_{7}$, or, in 1899, Sweden 160,000 and Norway 120,000 kronor; besides, the various fees received in salaried consulates, which in 1897 were reckoned to amount to 92,960 kronor from Swedish and 213,340 kronor from Norwegian ships, have been employed to defray the expenses of the Consular Service. Including these last items, Sweden's direct expenses for the above purposes amount to something more than 2,100,000 kronor, and Norway's to something more than 1,000,000.

With regard to *National Defense*, the Union Act contains no decrees as to the amount of the contributions, but that question is left entirely to the discretion of each nation. Certainly, the King is the supreme head of the military forces of both kingdoms, but with regard to Norway's army, his right of disposal is subjected to several restrictions, the most important of which is that the so-called »linie-armé» (the »line») are the only troops who may be employed everywhere for the common defense of the peninsula, while the remaining troops are not to be ordered outside the borders of Norway. In 1885, Norway adopted a new military organization, whereby the line was much reduced in strength, and it can, at pleasure, make further reductions.

The decrees regarding the Union of Sweden and Norway have been the subject of discontent in both countries during the whole existence of the Union, and **proposals for altering** this have often been brought forward, as yet, however, without the question having found any satisfactory solution. The efforts of the *Swedes* have tended to the strengthening of the Union on the basis of the programme: »equal rights and equal obligations for both nations» (by which, with regard to obligations, nothing is demanded from Norway that is out of proportion to its population and resources); the chief cause of discontent on the part of the Swedes has been Norway's disinclination to accept fixed duties in regard to mutual defense. The *Norwegians*, on the other hand, have striven to preserve the Union on its present narrow footing or still further curtail it; the drift of their grievances is that the Union, in its present form, does not place Norway in a position of full equality with Sweden.

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Most of the clauses in which, at the beginning of the Union, full equality was not established, have since by and by been altered according to the wish of the Norwegians. Thus, in external emblems, the co-equality has been complete ever since 1844. What now remains is practically nothing but the **treatment of diplomatic affairs,** which has in recent years been the great subject of controversy, and therefore ought to deserve a brief historical retrospect.

The Swedish constitution of 1809 enjoined that diplomatic affairs were not to be discussed by the cabinet in full conclave but were to be reported to the King by the Minister of Foreign Affairs in the presence of one other member of the Cabinet only. As regards Norway, it was agreed at the beginning of the Union to exclude from Norwegian Constitutional Law all clauses regarding the discussion of such business; both sides evidently proceeding from the supposition that these matters were, even when Norway was concerned, to be conducted by the Swedish Minister for Foreign Affairs — an arrangement which the Union Act directly prescribes for the case of an interim administration being in power. In order to meet the wishes of the Norwegians for the presence of Norwegian Councilors at the discussion of diplomatic business, the King issued, in 1835, an order in the *Swedish* Cabinet that at such discussions the Norwegian State Minister in Stockholm should likewise be present.

In March 1885, the Swedish Parliament passed an alteration in the Constitution of Sweden, in accordance with which the Swedish Prime Minister should also assist at discussions of diplomatic cases. The number of Swedish members in the diplomatic Council would thus have to be increased, and under those circumstances the *Swedish* Cabinet still further proposed, before the Bill was sanctioned, that a Norwegian Minister (besides the Norwegian Prime Minister) should be summoned to a council of this kind. The proposal was not carried, because the Norwegians demanded that this question should be discussed in the Norwegian, not in the United Council (as if it did not concern both kingdoms). The resolution of the Parliament was then ratified. A short time afterwards the King proposed that an addition should be made to the *Union Act* to the effect that the number of Norwegian members should, like that of the Swedish ones, be increased to three. The Norwegians then made fresh demands, partly that such diplomatic business, which might be regarded as only affecting the one kingdom, should be discussed by the Minister of Foreign Affairs in presence only of the Cabinet Councilors from that kingdom, partly that the terms should be so couched that the Minister of Foreign Affairs might be indifferently a member of the Norwegian or Swedish Cabinet. Against this, the Swedish side replied that such an extension of Norway's influence could not be conceded without a thorough revision of the Union Act, whereby Sweden's legitimate desires should also be realized. As no agreement could be come to, the matter was dropped.

In order to show that Sweden's opposition to the Norwegian demands did not proceed from any prejudice against equality of the kingdoms, in January 1893, the Swedish Government, on drawing up the Foreign Budget, took the opportunity to mention as its standpoint that through *mutual* concession a satisfactory solution for both kingdoms ought to be arrived at, both with regard to the settlement of the Foreign Ministry of both countries on a basis of equality with one Foreign Minister in common, Swede or Norwegian, and in the question of organization of the Consular system, — which is also connected with the Foreign Office.

After various ineffectual negotiations, a **Committee** of seven Swedish and seven Norwegian members was appointed, in November 1895, to draw up proposals for amended clauses with regard to the Union. The Committee separated in January

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1898 without being able to agree on any proposal. Four different opinions prevailed in this committee. The *majority of the Swedes* (five members out of seven) proposed that either a Swede or Norwegian might be appointed Foreign Minister, and that henceforward the Foreign Minister should be responsible to the Norwegian as well as the Swedish Parliament. *In compensation for which the minimum strength of the field forces of each country were to be mutually determined by a joint law.* Ambassadors to foreign Powers as well as consuls should continue to be common to both nations; likewise should the functionaries in the Foreign Department be common. It was, moreover, proposed that the King's Civil List and the Crown Prince's apanage should be fixed on succeeding to the throne or to the heirapparency, and should not be reduced for the same individual (the cause of such proposal being that the Norwegian Parliament used such reductions as a means of opposing the King and the Crown Prince).

The Swedish minority (two members) also adopted the proposal that the existing Swedish Foreign Ministry should be changed into a joint one, and might be held by either a Norwegian or a Swede, but as it considered such a ministry impossible without some parliamentary representation of the Union, it proposed that the Minister for Foreign Affairs in common to both countries should be answerable to a delegation of 30 members from each of the two parliaments. As a further condition for establishing a joint Foreign Ministry, this minority proposed that the King's right of employing the army of Norway in defense of the Union should be as great as his right to employ that of Sweden for the same purpose.

The majority of the Norwegian members (four out of seven) agreed about the proposal that a Norwegian should be eligible for the appointment of Foreign Minister, and that the aforesaid Minister should be answerable to both parliaments, but proposed that Consuls should be under the control of the Foreign Minister in common to both countries, only so far as relations with foreign bodies were concerned; besides, the Consular Service should be a joint one for e. g. the next fifteen years, but its fellow character subsequently may be renounced and in such case terminate after a period of five years. With regard to the civil lists of the King and Crown Prince, nothing was mentioned, *and as to the settlement of the national defense, no one was willing to contract any obligations.*

The minority of the Norwegians (three members) took the same attitude as the majority on the question of apanage and national defense; moreover, it claimed that Norway should not only have its own consuls, but also a Foreign Minister of its own.

As no sort of agreement whatever was arrived at in the Committee, their proposals were not laid before Parliament.

The foregoing account must have shown that Sweden has been, and still is, willing to enter into any reasonable arrangement with the other partner of the union.

One particular circumstance, which makes the concessions offered on the part of Sweden still more remarkable, is the *peculiar position of royal authority in Norway*, where it is so extremely circumscribed as to render it exceedingly difficult for the regent to maintain the interests of the Union in that country, as far as they fall outside the bare wording of the Union Act. The Norwegian King has in questions of legislation only a »suspensive veto» with regard to the Diet, which can be exercised twice, but ceases to be valid after a resolution accepted by the Diet on three occasions (at certain intervals).

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More cheerful than the political history of the Union is that of the closer drawing together of the two nations in other respects at the same time. In this respect, too, the last years have been less satisfactory, and a Commerce Treaty, dating from 1874, between Sweden and Norway had to be dissolved again, in 1897, after Sweden had reverted to a new system of duties, and had found it impossible to gain the consent of Norway to the alterations in the arrangements which had become necessary to prevent abuses arising from the difference in duties. But, on the other hand, in a number of cases, agreements have been entered into between the Swedish and Norwegian legislatures, and an approach by such means attained, which makes the two nations more allied with each other than with other peoples. In several civil matters, especially as regards industry and commerce, Swedes and Norwegians mutually enjoy privileges which are not granted to foreigners. Finally, with regard to the state of feeling between the two nations, this too, as a rule, is better than what might be expected from the bitter political struggles, and neither in Sweden nor in Norway has the hope yet been abandoned that the Union, which appears destined by Nature herself, shall some day become a reality in the hearts of both peoples.

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2. STATE ADMINISTRATION.

Just as the political Constitution of Sweden has a history of its own, marking it off from the constitutions of other countries, so the building up of the fabric of administrative government has been of a nature different in Sweden from elsewhere. It may probably not be unconnected with that instinct for organization which we have already had occasion to note as a distinguishing trait of Swedish national character that the administration of public affairs was established on a firm basis and was being carried on with considerable efficiency at an earlier date than in most other European countries; indeed, Swedish administrative government has served as a model for some of its neighbouring peoples.

A distinctive characteristic of the State Administration in Sweden is that every action on the part of any public authority or body can *be appealed against* to the next higher authority, in ascending scale to Government itself. This is even the case with regard to the appointment of civil servants. Another characteristic of the Swedish system of administration consists in all documents and papers emanating from any of the public offices of State, being held to be *of a public nature*, so that any one may demand a copy thereof and publish the same. Some few exceptions exist viz.: the minutes of proceedings before the King in Council, and the documents and papers of the Foreign Office bearing reference to diplomatic relations with abroad; these are kept back until after the lapse of fifty years; it need hardly be added that plans of mobilization and other papers of a character to prohibit their publication, in view of the safety of the country, are also kept from publicity.

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Before proceeding to describe briefly administrative government as existing at present in Sweden, it may be well to give a short sketch of its history.

During the Middle Ages, the King had the assistance in the administrative government of three great officers of state: *Lord High Steward* (Drotsen), *Lord Marshal* (Marsken), and *Lord High Chancellor* (Kanslern). The two first-named originally belonged to the King's household, the last being generally a churchman. No definite limits were fixed as to the several domains af activity of the Lord High Steward and Lord Marshal, but, before long, the former began to be regarded as the chief authority in affairs of justice and the latter in those of war, while the Lord High Chancellor acted as the King's secretary and had to draw up his mandates. These three offices were practically the only ones then existing for the kingdom as a whole, and the first two of them, at any rate, were often in abeyance. They never had anything in the nature of an organized department of officials under them.

In the several districts into which the kingdom was divided, and which often had a walled castle as its center, the King's administrative functions, both civil and military, were discharged by *Stateholders* and *Bailiffs* (Fogdar). Each of these held his district as a *fief* from the King and was subject to different conditions. Sometimes, he enjoyed the right to collect the revenues from the district on the sole understanding that he and his dependents should serve the Crown when need arose; sometimes, he had to render an account of his receipts, or again to pay a certain sum for his fief, the soldiers under his command being at the King's service. Sometimes, fiefs were held as security for pecuniary advances made to the Crown. These fiefs, for the possession of which there were perpetual struggles all through the Middle Ages, were not in fact hereditary, and, although some feudal terms and usages were introduced into Sweden owing to intercourse with Southern Europe, yet the feudal system itself never really obtained a firm footing in the country, even though attempts to introduce it were not wholly wanting.

Gustavus Vasa (1523/60) effected a thorough change in this system of enfeoffment. The fiefs were reduced in area and entrusted to *Bailiffs*, often commoners by birth and entirely dependent on the King. They had to hand in accounts of their revenues and of their administration, which were subjected to very close scrutiny. Between the King and his bailiffs were placed intermediaries in the persons of *Governors*. To control and administer the national finances, which were materially improved at this time by the confiscation of church lands, an institution was founded, termed *The Treasury* (Kammaren), a government office whose president became one of the chief officers of state. Another prominent official instituted in the times of Gustavus and his sons, was the *Lord High Admiral* (Riksamiral). Definite method and system had not yet, however, been introduced into the administration; everything depended as before on the personal influence and action of the King.

Well regulated administrative government was introduced into Sweden during the days of *Gustavus II Adolphus* (1611/32) and *Axel Oxenstierna* (1632/44), — being finally established by the *Constitution Act of 1634*, which at once placed Sweden in the first rank among the nations in administrative regard, rendering her, indeed, worthy to serve as a model for others. The State administration was permanently centralized in Stockholm and was entrusted to the following *Five Departments of State:* Svea Hofrätt (for the administration of justice), Krigsrådet (military council), Amiralitetet (naval affairs), Kansliet (foreign and some home affairs), Räknekammaren (finance etc.). Each of these institutions was under the presidency of one of the five great state

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officials: Lord High Steward, Lord Marshal, Lord High Admiral, Lord High Chancellor, and Lord High Treasurer, and as some of the assessors were to be found other Councilors of the Realm. The *Chancery* (Kansliet) was the most important of the five departments. Besides its own administrative activity, it had to see to all the secretarial business of the Government, including that of the other departments.

The kingdom was divided into certain defined administration districts, *Läns*, each under a *Governor* (Landshöfding). He was to have nothing to do with military matters; though, in those governments which lay on the extreme borders of the country, Governors-General might be appointed to exercise military authority also. The responsibility of officials for their stewardships was determined by a number of injunctions, which were, however, only partially put into application.

The most important changes made in the administration during the remainder of the 17th century were: that the number of central departments was increased, and that, during the period of absolute rule under Charles XI and Charles XII, the five high offices of state were left vacant. Moreover, the Councilors of the Realm (Riksråden) were gradually excluded from their share in the administration of the government departments, these becoming thereby more independent.

During the so-termed *Era of Liberty* (1718/72) the administrative functions centered in the Council (Rådet). The Chancery was the department where government business was prepared, and the president of that department, who was at the same time secretary for foreign affairs, was the foremost member of the Council. The Chancery was now, as at an earlier period, subdivided into a number of offices, the heads of which, usually entitled *Secretaries of State*, had to introduce measures that belonged to the special subdivisions they represented.

During the *Gustavian Era* (1772/1809), the Council was abolished by the constitutional revolution of 1789, having already lost much of its consequence. While the functions of the Council as regarded judicial powers were now entrusted to a newly established High court of justice, its administrative functions were for the most part transferred to the *Cabinet* (Konseljen), as members of which a number of high state officials were nominated, among them, the Secretaries of State.

Both during the period of Caroline Absolutism (1682/1718) and the periods subsequent thereto until the year 1809, occasional commissions for special branches of the administration had been appointed, whereby business was drawn away from those departments to the purview of which it really belonged. During the »Era of Liberty», too, the Riksdag encroached in a variety of other ways on the administrative domain; thus, for instance, by examining in detail the measures adopted by the departments and by interfering in the appointments of civil servants.

When the *Revolution of 1809* came about, that resulted in the establishment of the Constitution still in force, no changes of any importance were made in the administrative machinery. The Council was not, it is true, revived, but its place was taken by a Ministry or *Cabinet* (Statsråd), consisting of nine members, the majority of whom did not represent any special branch of the administration. Business was still prepared — with but few exceptions — in the Chancery and was brought before the Council by the Secretaries of State, who had the right of being present and voting at their sittings, when matters belonging to the branch they represented were being discussed. In 1840, this system was exchanged for the departmental system now in force.

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Since that date the **Cabinet** has consisted of ten members until 1900, when an eleventh ministerial office was created. Of the eleven actual members eight are heads of departments; the three remaining members, usually termed: Consultative Ministers, take part in the discussions and decisions of the Cabinet, discharge the duties of their fellow-ministers in case of their temporary absence, and assist them also in other ways, more especially in questions referring to *administrative jurisdiction*, for which in Sweden the Cabinet is the last resort. Since 1876, when the premiership was introduced, the *Prime Minister* (Statsminister) usually occupies one of these three consultative ministerships, though the head of the ministry has often held one of the secretaryships for a department. Of the three consultative ministers two at least should previously have administered some civil office.

In the **Departments,** subdivided into special *Bureaux*, cases are prepared to be laid before the King in Cabinet; the decisions there arrived at are subsequently drawn up in the said bureaux in documentary form. The administrative business proper is, however, in but few cases transacted in the departments, the majority of it being dealt with by a number of Central Boards of Administration. For each department there is a Secretary's Office (Kansli). These offices together with those of the Revising Judicial Office and of the Attorney General are known as the *Government Offices* (Kunglig Maj:ts Kansli). To assist him in the work of the department, the minister has an *Under Secretary of State* (Expeditionschef; in the Dep. of Foreign Affairs: Kabinettssekreterare), whose business is to take cognizance of, or supervise, the treatment of the business that comes before the department. The head of a Bureau has the title of *Kanslirâd*. Lower officials are Kanslisekreterare and Registrator (Recorder).

Since the creation of the new department (of Agriculture), the *apportionment of business among the several Departments of State* is in accordance with regulations laid down by royal decree of 1900 (March 31). The eight Departments of State are as follows: The Department of Justice, of Foreign Affairs, of Land Defence, of Naval Defence, of Home Affairs, of Finance, of Ecclesiastical and Educational Affairs, and of Agriculture. These departments are generally concerned with the business denoted by the denominations given; it may, however, be mentioned that under the administration of the *Naval Defence Department* also fall Pilots, Lighthouses, and Schools of Navigation; that the *Finance Department* has charge of Commerce, Industry, and Navigation; of the Customs; the Official Statistics (the greater part); the Pensioning of Civil Servants; that the *Ecclesiastical Department*, in addition to Church Affairs, has under its supervision Educational Establishments and Pious Foundations; that the *Department of Agriculture* exercises control over Public Forests, Crown Estates, Land-Surveying, General and Geological Maps, High-roads, the Veterinary Surgeons, and (ad interim) the Poor Law. The *Home Department*, besides other responsibilities, has the superintendence of Communications, the Public Health, and also Insurance Affairs.

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The great part played in the administrative machinery for several centuries past by the **Central Boards of Administration** has been already referred to in the short preliminary survey at the head of this article. In our days, their importance is somewhat less than, for instance, during the 17th century, though still very appreciable. The greater part of the general administrative business is transacted by them, and their independence, relatively speaking, of the cabinet still constitutes a characteristic feature of administrative government in Sweden. These Central Boards deal with the affairs that come under their notice, on their own responsibility. When required to do so, they make statements to the Government of their opinions, and make such proposals as they see fit; several of them have, moreover, an extensive local administration under their supervision. Complaints as to their decisions may be lodged with the Government.

In olden times, these administrative bodies were all arranged as *boards*, that is to say the right of decision was shared by all the members; at present, however, apart from those offices that have judicial functions, but few are conducted in that manner; all those of recent date are arranged as *bureaux*, where the head of the bureau is the determinative authority, and this system has been partially applied to some of the boards of older standing when opportunities for reorganization have offered.

The most important of the Central Boards of Administration (not including Courts of Justice) are: Under the *Department of Justice:* The Prison Board. Under the *Department of Land Defence:* The Military Department. Under the *Department of Naval Defence:* The Naval Department and the Pilot Service. Under the *Department of Home Affairs:* The General Post Office, the General Medical Council, the Road and Canal Office, the Central Telegraph Office, and the Railway Office. Under the *Department of Finance:* the Kammarkollegium (the old Treasury, later an office of land revenue, tithes etc.), the Exchequer Department, the Mint, the Assay House, the Board of Trade, the Audit Office, the Commissioners of the Customs, the Central Bureau of Statistics, the Public Buildings' Office, the Post Office Savings Banks Department, and the Patent and Registration Office. Under the *Department for Ecclesiastical Affairs:* The Public Record Office and the Royal National Library. Under the *Department for Agriculture:* The Central Public Surveyors' Office, the Board of Control of Studs, the Geological Survey of Sweden, the Crown Lands' Office, and the Board of Agriculture. All these Boards of Administration have the epithet Royal prefixed to them, with the exception of the Public Surveyors' Office, the Geological Survey of Sweden, and the Public Record Office.

Another noticeable feature in Sweden as regards the subject in hand, is the circumstance that, besides these different Boards affiliated to the Departments of State, there is a number of offices and officials who are solely subservient to **Parliament** (Riksdag) and cannot therefore receive orders from the Government. This is the case with the *Bank of Sweden* (Riksbanken), with the limitation that, since 1898, Government has appointed the Chairman of the Board of Directors. The *National Debt Board* (Riksgäldskontoret) is also directly under Parliament, as is the *Solicitor General of the Riksdag* (Justitieombudsman). Concerning this official, information will be found above (under Constitution). As has been stated above, Parliament also appoints *Auditors* every year to revise the public accounts.

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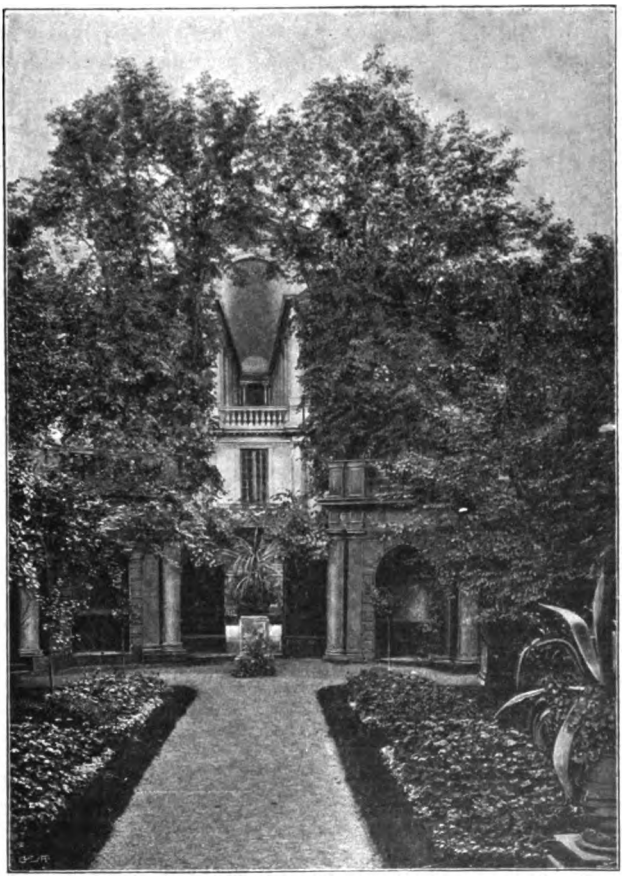
The **Local Government** in Sweden dates in its present shape from 1634, when the subdivision of the country into certain defined **Läns** was made. Each Län then received a *Governor* (Landshöfding) as the King's executive representative and its administrative head. In the City of Stockholm, forming a län by itself, the Governor has the title of *High Governor* (Öfverståthållare), and is supported by a *Deputy High Governor* (Underståthållare). The permanent offices under the Governor of a län are: a secretarial and a fiscal department, each under a chief clerk. In case of the absence of the Governor these two officials exercise his functions jointly, the right of decision resting with the one under whose department the case in question falls. — The number of läns (including the City of Stockholm) is 25.

In the Administration of the läns a strict difference is made between town and country. In **towns** the highest authoritative body under the Governor is the *Magistrate*, consisting of a Mayor — in Gothenburg two Mayors — and Aldermen. The latter are elected by the townspeople, as are also the Mayors, though, in their case, Government appoints to the post one of the three candidates at the top of the list as elected by the town. It must be remembered that a Mayor in Sweden is a professional lawyer and retains his (salaried) post for life or until pensioned off. — The Magistrate is likewise a court of justice.



The Official Residence of the High Governor of Stockholm.
From the Garden.

The **rural** districts are subdivided for administrative purposes into a number of *Bailiwicks* (Fögderier) with a Bailiff at the head of each, while a bailiwick is divided into a number of *Constablewicks* (Länsmansdistrikt) under a Constable. A bailiwick has a District Clerk with the special duty of drawing up the schedules of the ratepayers. The total number of bailiwicks in Sweden is 117, of constablewicks, 518. The area of the former averages

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3,817 sq. kilom., of the latter, 862 sq. kilom. (a sq. km. = 0·386 sq. mile); the corresponding figures for population reading 34,000 and upwards, 7,700 and upwards, respectively.

In the City of *Stockholm* the business falling within the scope of the High Governors' authority is allotted to three departments: for secretarial work, for the collection of taxes, for constabulary — each under a Chief Clerk. The Magistrate in Stockholm, as in other towns, consists of the Mayor and Aldermen, there being this difference, however, that the latter are appointed in the capital by the same method as is applied solely to the Mayors of other towns (see above).

Public Officials of the State in Sweden enjoy a large share of independence, their positions being secure, irrespective of the fluctuations of political opinions and parties and also of the possible caprices of superiors. All judges, and most of the other officials too, are exempt from removal from their posts, *no dismissal being possible* unless after inquiry and sentence upon misconduct, nor can they be removed from one locality or post to another, unless by their own consent. Ministers of the Crown, Under Secretaries of State, most of the heads of central boards of administration, etc., officials in the Foreign office, and officers in the army of high rank, including even commanders of regiments and corps, are the only officials who can be dismissed by the King; the case must, however, always come before the Cabinet. Instances of such dismissal have occurred, indeed, but they are very few in number. — On the attainment of a fixed age, usually 65, a public official is bound to retire from service, but is entitled to a pension.

Though a public official in Sweden enjoys a large measure of independence, yet his work is subjected to control. For a very long time provisions have existed for a careful inquiry to be held into the disposition of public money. This inquiry is conducted on the one hand — and in detail — by the *Audit Court* (Kammarrätten) in Stockholm, and on the other by the *Auditors* that the Riksdag annually appoints. Shortcomings in the exercise of their duties on the part of judges and other officials are dealt with by one of two officials: the *Attorney General*, an officer of state appointed by the King, and the *Solicitor General of the Riksdag*, appointed annually by Parliament. For the prevention, moreover, of evil practices on the part of public servants the press is a very powerful agent. Its unrestricted liberty is ensured it by a fundamental law ad hoc.

In the *filling up of vacant posts*, merit and ability are to be the sole grounds to be considered; in appointing to the subordinate posts, attention is generally paid to the number of years' service the several candidates have to show. With the exception of the lowest offices, it is generally requisite to have obtained university degrees or else ordinarily to have passed the university entrance examination to obtain entry into the state employ. Officials are, a great part of them, *appointed* by the King in the Cabinet, subsequent (save in the case of higher officials) to application, in due form as soon as the post has been officially declared vacant. The *remuneration* received is usually apportioned partly as salary proper and partly as payment for time of service, the latter

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being only obtainable during such time as the official in question is actually at work — with exception for such time as he may be away on his regularly stipulated holidays. The salaries in most central offices are in three grades: 3,000, 4,500, and 6,400 kronor (a krona = 1·10 shilling). Of these sums, 1,200, 1,500, and 2,000 kronor respectively are classed as payment for time of service. To those receiving the lowest figure and the second lowest an additional sum of 500 kronor is granted after five years' service and another 500 kronor after five years' more; those receiving 6,400 obtain one addition of 600 kronor after ten years' service. The heads of the central boards of administration generally receive from 7,000 to 10,000 kronor. Ministers of the Crown receive 12,000 kronor, if without a department, 17,000 kronor, if with one. The Foreign Minister has 24,000 kronor and his residence free. The Prime Minister receives an additional sum bringing his total emoluments to 18,500 kronor. — The *pension* consists of the amount of the salary proper plus the additional sums after five years' service etc., but without the payment for time of service (see above).

In some of the institutions of the *Local Administration* (for instance in the Customs Department, on the Railway, or in the Post Office) the position of the officials is not quite so independent as in the State Administration in general; thus they may be moved from one office to another contrary to their own wish.

Official Statistics.

Sweden is »the classic land of population statistics». But also in many other departments Swedish statistics are of valuable importance and of ancient origin — a result of the high level early attained by the administration of the country, as has been fully shown in the preceding pages.

There exist in the archives of the State great piles of registers, extending back over several centuries, forming an exceedingly valuable material, which, however, hitherto has only occasionally been submitted to statistical treatment. Of the works published on this matter may be mentioned here: H. FORSSELL's extensive works on Population and Agriculture of Sweden in the latter half of the 16th century.

The present system of collecting and preserving official reports in Sweden is not so *centralized* as desirable. It is true that we possess a »Central Bureau of Statistics», but under its purview come but a comparatively small number of the branches of statistics: most of these are in the hands of special offices in the several departments of the administration. In regard to *formality*, however, Swedish statistics show a very high degree of uniformity, the greater number of the publications issued on the subject being included in a single series: Bidrag till Sveriges officiella statistik (Official Statistics of Sweden). The outward unity of this series is ensured by the *Statistical Tables' Commission*, consisting of representatives for all the departments whose publications are included in the series mentioned — with the head of the Central Bureau of Statistics as Chairman. This Commission has also to give their opinion on questions of organization concerning the different branches of statistics.

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In the series: *Bidrag till Sveriges officiella statistik*, each branch has its own letter. The different divisions are: A) Population. B) Justice. C) Mining. D) Manufactures. E) Shipping. F) Commerce. G) Prisons. H) Quinquennial reports of the Governors. I) Telegraphs and Telephones. K) Hygiene and Hospitals. L) Railways. M) Post-Office. N) Agriculture. O) Land Surveying. P) Public Instruction. Q) State domains. R) Elections. S) Public Works. T) Pilots and Lighthouses. U) Poor-law Administration and Local Finance. V) Spirits and Beet-root sugar. X) Salaries and Pensions in the administration. Y) Savings-banks. — Sections A, H, N, R, U, and X are issued by the Central Bureau of Statistics, as well as that part of section Y which treats of private savings-banks.

Not included in the series: Bidrag till Sveriges officiella statistik, are the statistics relating to Banks, Insurance, Sick-Relief Funds, Prices, etc., as well as the preliminary monthly reports on the imports and exports of the realm, and, finally, Social statistics, which latter section is issued by the Board of Trade. — By the Central Bureau of Statistics a *Journal of Statistics* is issued, which, amongst other matters, embraces an annual résumé, corresponding to the Statistical »Yearbooks» of other countries.

The **Swedish Central Bureau of Statistics** is the oldest official department of its kind in the world, as it dates back to the year 1756, when it was founded under the title of the *Statistical Tables' Commission*. The task of this Commission, however, only embraced the statistics of population. Its present title the department received in 1858, since which time its field of labour has gradually widened (see above). Its present organization dates from 1879. The head of the department, — titled Chief Director — is the sole deciding authority. The work is divided between three sections, each with its »First Actuary» as chief; there are, besides, a librarian and an archivist. The total expenses of the bureau (house-rent is not paid) usually amount to about 80,000 kronor per annum.

The Central Bureau of Statistics continues to issue the Swedish **Vital Statistics**, that occupy so famous and so honourable a place in the history of this science. The Swedish ecclesiastical law of as early a date as 1686, enjoined the clergy to keep regular registers of the population of their parishes as well as lists of the births, marriages, and deaths. Consequently, when in 1749 (after certain preliminary attempts ranging back as far as 1721) the scientific treatment of these statistics began, there existed thus a routine of sixty years to start from. This explains the otherwise inexplicable fact that Swedish statistics of population was »born adult». The registers kept by the clergy form, even nowadays, almost the only source of these statistics. The important change in their arrangement was, however, made since 1860 that the primary reports from the parishes do not any more appear in the form of completed tables, but as *nominative* registers, the centralization and elaboration of which are the work of the Central Bureau of Statistics.

Census in Sweden (and in its late daughter-land Finland) is also based upon the registers of the clergy, instead of being entrusted, as elsewhere, to whole armies of specially appointed reckoners who on the census-day spread all over the country. The Swedish method has often struck foreign specialists as a very strange one, and persons who have not had the opportunity of getting acquainted with the admirable carefulness and accuracy of the Swedish administration, have often doubted the value of the method. This has been the case, for instance, with the eminent German statistician *G. von Mayr*, in his great

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work: »Statistik und Gesellschaftslehre», a work which will probably long remain an authority in this science. This being the case and the question being of some importance to Swedes, it may not be inappropriate in a *statistical* handbook of Sweden, briefly to discuss this criticism.

Mr. von Mayr bases his opinion on the defectiveness of the Swedish method upon the fact that, in keeping continuous registers, *increase* (by births and immigration) always proves easier to control than *decrease* (by deaths and emigration), and thus a population figure calculated in this manner, will always prove too high. A confirmation of this theory Mr. von Mayr finds in the present figures for Sweden relating to the population of advanced ages, figures which he considers improbable in themselves, and proving that many old persons having long been dead or having left the country still remain on the registers. That this is the case, is, according to Mr. von Mayr, proved also by the Swedish death-rates of advanced ages, which are abnormally low — simply because, as he says, the population-returns of aged people show too high figures.

It is, however, evident to every Swedish specialist on this subject that his criticism must be untenable. It has not, by any means, escaped the attention of the curators of our Swedish vital statistics that decrease is more difficult than increase to register exactly, especially since the occurrence of emigration; on the contrary, a remedy has, during the last thirty years, been sought against this difficulty, by directions to cancel from the registers those *not to be found* (disappeared from their domiciles), a decree which worked so effectually that it had *to be moderated* by means of the new law of 1894. All Swedish statisticians, too, seem to be agreed that our census reports give rather somewhat too *low* a result, and by no means too high a one.

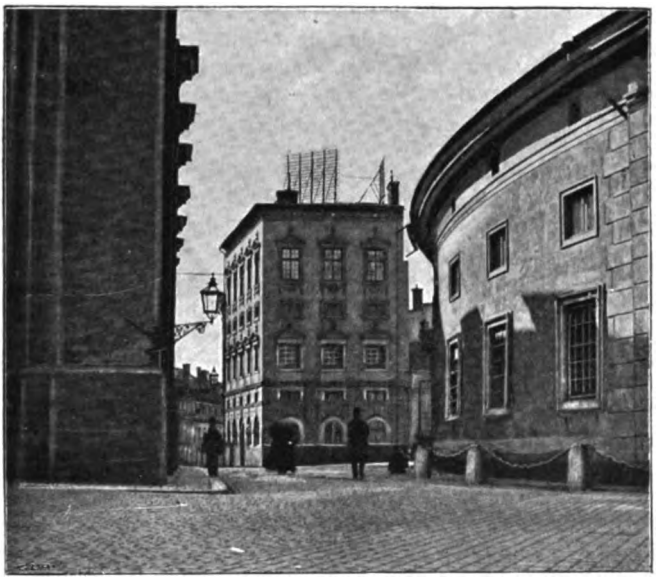

Photo. K. SIDENBLADH j:r.

Office of the Central Bureau of Statistics.

With regard to the present high population figures in the advanced-age groups in Sweden, the causes of this fact have already been fully shown (pages 111 and 112). That the Swedish figures are not, in themselves, unacceptable, may be clearly seen from the fact that still higher figures for several of these advanced-age groups have been shown by Norway, a country, moreover, which carries out its census in accordance with the method which Mr. von Mayr considers the only right one. The same remarks hold true respecting Mr. von Mayr's opinion that the *death-rates* given for Sweden in these advanced-age groups are absurdly low. The mortality in Sweden is, on the whole, nowadays somewhat lower than in Norway, but the contrary is the case just within the ages in question.

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This being so, the death-rates given for Sweden, for these ages, cannot, of course, in themselves be inadmissible.

And finally, as for the great *decrease* of mortality in Sweden for the advanced-age groups, which Mr. von Mayr also regards as improbable, this decrease is, first of all, not so extraordinary as he seems to suppose (cf. Table 23, p. 124, and Table 24, p. 126); and furthermore, a considerable decrease in the death-rates of those groups has long been expected and, indeed, foretold in this country, because those groups are now, for the first time, represented by a generation which in childhood had the advantage of vaccination. That generation has ever since proved to be endowed with greater vital power from age to age, as compared with previous generations, and nowadays it shows the same phenomenon in the ages which approach the limits of life.

To show that Swedish specialists justly consider our census method superior to that prevalent in other European countries, — may be mentioned that, as regards the city of Gothenburg, which on the strength of local regulations had used to employ the common European census system, it was decided in 1890 to *cease* using it and to adopt the general Swedish census method, a preliminary inquiry having fully shown that this latter would bring out a more accurate result. At Stockholm, the common European system is still in force on account of a peculiar registration law — as formerly in Gothenburg — but even here a proposition has been made with a view to adopting the general Swedish plan, this city being the only place where it is not yet employed.

The above has been alleged for the purpose of substantiating the statement that the census returns as obtained in Sweden are thoroughly reliable with respect to total population figures. As to the points of repartition concerning age and civil conditions, the correctness of census results in this country is indisputably greater than in any other, and that very naturally so, as these reports are obtained, in Sweden, from official documents, while, in other countries, they are obtained from the people themselves. Only in *one* respect is our Swedish material inferior, viz. in the denominations of *occupation*. But the opinion is more and more gaining ground everywhere, that this point *cannot* be satisfactorily solved at a *general* census, but that recourse must be had to a special census of professions. This is, of course, a *question of expense*. As to the costs for census, the Swedish method stands unparalleled, the whole of the necessary material being supplied *gratis* by the clergy.

Finally it may be stated that the first census is of 1749; during the period 1751/75 one census was taken in every three years, from then till 1860, every fifth year, and finally, as at present, every tenth year (1870, 1880, 1890, and 1900), always on December 31. Since 1860, the clergy have, moreover, *annually* sent in figures of population, they being enabled to do so by the uninterrupted registers running on from year to year. This system has brought out so reliable a result that in respect to political rights, which, in Sweden, are based upon the population figures, these annual reports are unhesitatingly received as legal evidence.

Brief accounts of the **other branches** of Swedish statistics are given in the sections dealing with their respective subjects.

Official Maps.

A) **Surveyors' Maps.** Formerly it fell to the lot of public land-surveyors in Sweden to produce and take charge of maps of various descriptions: geometrical, geographical, hydrographical, and military. The first instructions given to a head official at the institution of public

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landsurveyors, dates from 1628. In course of time the scope of the duties of public landsurveyors has been restricted, all the different kinds of maps above mentioned, with the exception of the geometrical, having been transferred to the care of other officials.

In 1900 the staff of public surveyors numbered 216, with an additional of 333 assistant surveyors. They are distributed throughout the country, and landowners can employ the surveyors of the first class for any surveying work which they require to have done. As a rule, such work must be paid for in full, or at any rate nearly so, by the employer.

The chief duty of public landsurveyors is the legal allotment of the land (Laga skifte), especially that of the larger villages, where every peasant had a number of small lots, which one is trying to unite into larger or even into a single lot to each. In Norrland, where equitable partitioning of land is also carried out as in the rest of the country, there is also a special kind of the same sort of work that devolves upon public landsurveyors, viz. delimitation of the Crown forests (Afvittring), whereby arable tracts within the former boundaries of the forest are excluded and entrusted to private owners; this work is now attaining its completion. (In the chapter on Agriculture further notice is taken of the partitions here mentioned).

For Surveyors' Maps the usual scale is 1 to 4,000 (for arable land); scales of 1 to 2,000 (for building-lots) and of 1 to 8,000 (for forest land) are also sanctioned by law. The Surveyors' Maps together with the detailed descriptions of the characters of each land-area afford a conspectus of the amount of arable, meadow-and forest land etc. in the possession of each landowner. The originals in both cases (maps and descriptions) are deposited in the Public Surveyors' Office of each Län, while copies are handed over, not only to the owners, but also to the Central Public Surveyors' Office in Stockholm.

The large collection of these maps — contributions to which have been coming in from all parts of the kingdom for quite 270 years — forms (together with such Economic Maps as are extant) an approximate counterpart to the institution in other countries termed Cadastre (Doomsday-Book). It should, however, be remembered that, as it is not obligatory to the landowner to have Surveyors' Maps drawn, there are many estates for which maps are wholly wanting, or, if extant, are of very ancient date. Public registers of land, or lists of all estates, embracing assessment standards (»mantal») or other ancient bases of taxation from all parts of the country, are kept in the offices of the Kammarkollegium in Stockholm, while the same information as regards each län is also found in the records of the Län Administration.

B) **The General Map Department** (Rikets allmänna kartverk) as constituted in 1894, is an amalgamation of two still existing Survey and Map Offices, viz. that for Economic Maps and that for Topographic Maps, both of which since 1873 have been placed under the supervision of the Head of the Topographic Section of the Army General Staff. The work of this section is done partly by staff officers and other military men, partly by civilians.

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The Head of the above mentioned section of the Army Staff together with the Heads of the Geological Survey of Sweden and of the Nautical Chart Office and some other persons, form a *Commission of Control for Map Works*, being a board of superintendence for all the Map Departments above mentioned. Chairman of this commission is the Head of the Army General Staff.

The projection adopted for the Topographic maps of Southern and Central Sweden, where the map-sheets are produced in rectangular form, is the so-called increasing conic, while for North Sweden, where the map-sheets are divided according to the parallels of latitude and the meridians of longitude, the polyedral projection is employed. On the rectangular sheets the meridians are straight lines, while the parallels become concentric circles. The standard meridian adopted is the one that passes 5° west of the Stockholm Observatory.

Measurements of bases and of triangles together with astronomical determinations of locality afford the chief foundation of the maps. Standard-leveling has been going on since 1885 for obtaining reliable starting and verifying points from where the altimetry of the country in detail is to be taken. The altitudes are entered on the maps.

a) **The Economic Map Office** (Ekonomiska kartverket) is more particularly concerned in procuring accurate information as to the areality of the kingdom and how the country is distributed in economic regard (to the categories of arable, meadow-and forest land etc.). The Office was instituted in 1859 and is properly a development of the former Parish Map Establishment, for which the maps were drawn by the public surveyors. The Economic maps afford pretty much the same information as the surveyors' maps, though not on so large a scale, nor in such detail.

The process of making these economic maps is as follows: a skeleton map on a scale of 1 : 20,000 is drawn, on to which the surveyors' maps are transferred, the points of junction being accurately adjusted by means of triangle points. Where no surveyors' maps exist, special measurements are taken. The economic maps are amplified on the spot and published for each hundred (härad) in lithographed copies, provided the local agricultural society, the county council, or similar public body votes a requisite grant; furthermore, descriptions of the areality of the district are drawn up and issued at the charge of the State.

The construction of these economic maps has proceeded principally in Central Sweden, maps on a scale of 1 : 50,000 (for North Vermland of 1 : 100,000) and descriptions having being already issued (for Skaraborgs län only the latter). Maps on a scale of 1 : 100,000 and descriptions of areality are out for the coast district of Norrbottens län, for which a special section of the Economic Map Office has hitherto been organized. Concerning the economic-topographic maps, see below.

b) **The Topographic Map Office** (Topografiska kartverket). The Institution of public surveyors having in 1789 stopped carrying out geographical mapping work of the kingdom, it was taken in hand by a private individual, Baron S. G. Hermelin, who spent a great amount of work and money especially on the development of Lappland. He

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supplied the necessary means for a complete system of maps for (the läns of) both Sweden and Finland during the years 1797/1818; the copper-plates on which the originals were engraved were subsequently purchased by the Government. In 1805, a body of »field surveyors», subsequently named the Topographical Corps, was constituted for topographical mapping work; since 1874, this body of officials has formed a special section of the Army General Staff (Generalstabens topografiska afdelning).

The skeleton maps, for which surveyors' maps are used, and also the economic maps, are laid down and worked out on a scale of 1 : 50,000, except in the more northerly parts of the kingdom, where the scale of 1 : 100,000 is used. The Army Staff, or Ordnance, maps of Sweden are printed from copper plates, but lithography is also employed. For Southern and Central Sweden the maps are rectangular sheets on a scale of 1 : 100,000, but, for Northern Sweden, sheets divided according to meridians and parallels, on a scale of 1 : 200,000. These last maps also embrace economic data and are consequently economic-topographic. The parts of the country not yet mapped out topographically, are chiefly the southern and central portions of Norrland. Topographic maps on a scale of 1 : 200,000, together with descriptions, have been made of some provinces, but it is not intended to complete this work. For certain topographic maps, other scales, both larger and smaller than the aforesaid, are also used.

Samuel Gustaf Hermelin.

A considerable number of maps have also been published by *private enterprise;* we may mention here those by A. Hahr, E. G. Liunggren (Atlas of the Cities of Sweden), N. Selander, E. Cohrs, V. Petterson, H. Byström, and others.

C) **Geological Maps.** In Sweden maps of mines have long been in existence; e. g. a map of the Falun Copper Mines was drawn in 1629 and is still extant, but the earliest petrographic maps of the country were not published until the beginning of the 19th century. In 1858, a special Office was instituted, viz. the *Geological Survey of Sweden*, charged with making general geological researches in the interests of science, agriculture, and industry, and instructed to publish the results of their work in the form of maps and accompanying descriptions. A typical geological map, by the aid of different colouring, shows the appearance of the ground surface, not only the varieties of rock being given, but also the varieties of soil; a map of that kind is a plan chart (without the relief of the ground). Recently it has been determined that the varieties of soil shall be included on the topographic maps (with the relief) and that special geological maps showing the varieties of rock shall be drawn; the publication of the first named kind, how-

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ever, is to cease. Thus two kinds of geological maps are now being issued: the ordinary ones showing the varieties of both soil and rock, and special ones showing only the varieties of rock. On neither kind does the relief of the ground appear.

As ground work for geological survey are to serve: copies of the topographic or economic maps on a scale of 1 : 50,000 (maps of that scale now exist for the whole of the Lake Mälar basin and adjacent country, for the greater part of Skåne, and for considerable parts of Elfsborgs län); also topographic maps on a scale of 1 : 100,000; these latter, however, have been published (without the relief) as geological maps on a scale of 1 : 200,000 for the greater portion of Småland, almost the whole of Halland, and the southern part of Elfsborgs län; the publication of the geological maps on the scale of 1 : 200,000 is to cease and then the scales 1 : 50,000 and 1 : 100,000 will be used in publishing such maps, and 1 : 200,000 or 1 : 500,000 for the maps showing only the varieties of rock. This office also publishes maps on other scales as well as papers and treatises connected with its work. All maps are printed by lithographic presses.

D) **Nautical Charts** (Sjökarteverket). In 1756, the Swedish State began to undertake the issuing of reliable nautical charts, and during the remainder of that century a large number of charts of the coasts of Sweden were published. Between the years 1797 and 1848 surveys were still being conducted by direction of the State, but the maps were published by private persons. Finally, in 1849, a special office was established for the superintendence of this work; it was to be subordinate to the Admiralty and has been known, since 1871, as the *Nautical Chart Office* (Sjökarteverket). The plates existing at that time were acquired by the State.

The charts published by the Nautical Chart Office are: navigation charts, on a scale of 1 : 300,000 and 1 : 550,000; coast charts on a scale of 1 : 200,000 and 1 : 250,000 (both the navigation charts and the coast charts being constructed on Mercator's projection); and special charts on a scale of 1 : 50,000 and 1 : 100,000 (conic projection). The Swedish nautical charts embrace the Baltic, the Kattegat, and the Skagerack, and the larger inland lakes of Sweden. Furthermore, the Nautical Chart Office publishes periodically a descriptive work on navigation, entitled: The Swedish Pilot (Svenske lotsen).

State Finances.

In regard to the administration of the State Finances, it may be pointed out as a peculiar feature that the National Debt is administered by a *National Debt Board* (Riksgäldskontoret) not responsible to Government but directly to Parliament. When first founded, this office was also charged with collecting and administering part of the public revenue and had with this to discharge certain expenditures of the State, but that constituent of its duties was removed in 1874. The management of the State's revenue and expenditure is conducted by the *Exchequer Department* (Statskontoret).

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Another peculiar feature with regard to financial administration arose from the nature of the old Swedish military tenure establishment (Indelningsverket). On that system, the occupiers of certain farms were required by payments in kind to support the army; consequently that portion of the military expenditure found no place in the budget estimates. In 1885, however, this burden was considerably reduced; from 1893 inclusive, a progressive compensation has been paid by the State; in 1901, finally, the whole system was abolished. The above mentioned compensation making its appearance in the budget in due course, accounts partly for the great increase in the Swedish budget estimates for land defense during the last few years.

The total amounts of State **Expenditure** during the period 1866/1900, so far as entered in the budget estimates, appear in Table 32.

TABLE 32. *National expenditure for the years 1866/1900.*[1] (A krona = 1·10 shill.).

Average for the years	Mean population.	Expenditure of the State. Kronor.	Per inhab. Kronor.	Expenditure. Kronor.		
				Army and Navy.[2]	National Debt.[3]	Other.
1866/70	4,166,000	48,637,000	11·67	16,762,000	5,208,000	26,667,000
1871/75	4,274,000	56,684,000	13·27	20,135,000	6,148,000	30,401,000
1876/80	4,500,000	76,850,000	17·08	27,358,000	9,117,000	40,375,000
1881/85	4,605,000	81,222,000	17·64	26,998,000	9,515,000	44,709,000
1886/90	4,742,000	91,153,000	19·22	29,670,000	10,069,000	51,414,000
1891/95	4,832,000	102,497,000	21·21	34,414,000	9,947,000	58,136,000
1896/00	5,032,000	127,888,000	25·41	46,416,000	9,053,000	72,419,000
In 1900	5,117,000	151,074,000	29·52	58,019,000	8,565,000	84,490,000

In the budget estimates a distinction is made between so-called *ordinary* and *extraordinary* expenditure. The former category, embracing sums assigned to be paid year by year, does not admit of alteration or abolishment without the consent of Government; this, however, is not clearly stated in the constitutional laws. — The great bulk of public expenditure is classified in ten (before 1901, nine) separate *Heads* (Hufvudtitlar), the first of which is the Civil List, the tenth the Pension List, while the remaning eight correspond to the eight government departments. The payments made by the National Debt Board are not, however, included in the ten »Heads», and the same is the case with a number of other grants of a more occasional character. Compare further Table 33.

[1] Actual amounts (not budget estimates). During the years 1869/78 the working expenses of the state railways were also put down in the account of national expenditure; likewise during the years 1866/76 the grants made for the construction of new railways and obtained by borrowing. For the sake of comparison with later periods these items are *omitted* from the table above. On the other hand, for the same purpose, the outgoing payments on behalf of the telegraph service for the years 1866/71 have been *added*, and the payments from the National Debt Board for the years 1866/76. Some other small differences have been neglected. — [2] Military pensions excluded. That the considerable increase of late years is in part only apparent, is shown by what has been said in the text above. — [3] Interest and amortizations, but interests received deducted; the latter now amount to more than 3 million kronor yearly, for several state loans have been transferred as loans to private railway companies.

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TABLE 33. *Specification of the National Expenditure.*

Expenditure. (A krona = 1·10 shilling).	In 1870. Kronor.	In 1880. Kronor.	In 1890. Kronor.	In 1900. Kronor.
Under the nine Heads.[1]				
I. Civil List	1,417,000	1,218,000	1,320,000	1,420,000
II. Dep:t of Justice	2,801,092	3,865,862	3,958,670	4,103,234
III. Dep:t of Foreign affairs	635,311	626,340	608,614	971,755
IV. Dep:t of Land defense	10,385,160	18,320,868	21,744,775	39,396,506
V. Dep:t of Naval defense	5,974,035	6,284,424	8,261,047	18,622,244
VI. Dep:t of Home affairs	4,121,216	5,709,045	6,663,912	11,528,674
VII. Dep:t of Finance	7,727,854	16,176,558	17,522,326	28,631,143
VIII. Dep:t of Eccles. affairs	5,360,920	10,958,782	14,400,144	19,253,046
IX. Pensions	1,983,585	3,336,552	4,822,653	5,890,495
Other Expenditure.				
State Railways[2]	—	—	2,400,000	8,170,000
National Debt[3]	5,675,438	10,571,973	10,271,125	8,564,702
Other[4]	1,544,168	1,236,145	1,756,964	4,522,307
Total	47,625,779	78,304,549	93,730,230	151,074,106

The State Revenues are also divided into »ordinary» and »extraordinary» ones (the latter also called Bevillningar), which names are rather misleading though: the only difference being that the former are regarded as unalterable without the consent of Government. In former times, the ordinary revenues were the more considerable; now they constitute only about 20 % of the total.

A) Among so-called **ordinary revenues,** the first to be noticed is the yield from State property. Of this, the agricultural demesnes are for the most part let out on lease, and fetch the *rents* given in Table 34. *Woods and forests*, on the other hand, are managed directly by the State. That is the case, too, with the State *Railways* and *Telegraphs*, the income from them being classed among the ordinary revenues (while that from the post-office service belongs to the »extraordinary»). Another item of ordinary revenue are the *Lighthouse and Beaconage Dues.*

The great increase of *revenue from rents* between 1870 and 1880 is accounted for by the fact that, during this period, a number of civil servants began to receive their stipends solely in money, in lieu of residence rent free, their official residences being let out on lease. That the amount has since decreased is due, partly to a fall of rents and partly to the fact that a number of small crown estates were disposed of, forest land being in many places purchased instead. — The great increase in the *revenue from forests* has resulted, partly from the increased area of the State forests, partly from a more systematic management of them, partly also from improved means of communication, and from the exceptionally favourable state of timber trade in the markets of the

[1] From 1901 the »Heads» are ten, the new Department of Agriculture forming the ninth, and the Pensions the tenth. — [2] For construction and new rolling stock. Borrowed capital is not here included. — [3] Compare note 3 on page 205. — [4] For the year 1900: expenses for the Riksdag and its Offices, 733,423 kronor; to the Fund for insurance of workmen, against accidents etc., 237,392 kronor; to the Fund for insurance of workmen against invalidity 1,400,000 kronor; etc.

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TABLE 34. *National Revenue for the years 1870, 1880, 1890, and 1900.*[1]

Revenue. (A krona = 1·10 shilling).	In 1870. Kronor.	In 1880. Kronor.	In 1890. Kronor.	In 1900. Kronor.
Revenue called »Ordinary».				
Rents on Land	439,722	2,886,324	2,607,728	2,194,877
Forests	313,431	1,323,512	3,150,074	8,279,718
State Railways (net)[2]	2,915,661	6,200,000	6,500,000	7,000,000
State Telegraphs[5]	766,229	1,227,863	1,444,909	1,846,774
Lighthouse and Beaconage Dues	801,223	1,191,474	1,506,214	1,766,110
Capitation Tax	559,390	643,679	663,033	749,423
Land Tax	6,969,673	6,027,174	4,392,798	947,837
Miscellaneous	928,409	1,682,953	1,273,336	1,395,029
Revenue called »Bevillningar».				
General Supply (see p. 208)[3]	2,789,394	5,941,641	4,810,204	8,711,223
Customs	15,805,034	27,622,164	42,675,131	57,731,764
Stamps	1,347,872	3,104,685	3,526,387	6,606,207
Excise on Spirits	10,990,167	15,209,494	16,287,351	21,708,416
Excise on Beet sugar	—	70,650	997,976	9,946,573
Post office	2,447,219	5,136,040	7,328,418	11,883,965
Other revenue.				
Of the Profit of the Bank of Sweden[4]	1,504,352	1,300,000	1,300,000	——
Miscellaneous	132,637	1,074,003	2,489,324	4,471,290
Grand totals.				
Revenue called »Ordinary»	13,693,738	21,182,979	21,538,092	24,179,768
Revenue called »Bevillningar»	33,379,686	57,084,674	75,625,467	116,588,148
Other revenue	1,636,989	2,374,003	3,789,324	4,471,290
Total revenue for the year	**48,710,413**	**80,641,656**	**100,952,883**	**145,239,206**
Surplus from previous years	1,634,700	——	5,582,000	21,396,373
Total	**50,345,113**	**80,641,656**	**106,534,883**	**166,635,579**

world that has prevailed for some years past. The revenue from the *State railways* has increased owing to the extension of the mileage worked and to the growth of traffic in the aggregate; there has, however, been a relative decrease in yield, per mile worked, because of the considerable new lines of railway in the thinly populated but extensive regions in North Sweden, where they at present only serve to promote the opening up of the country to industry and cultivation, and consequently yield as yet little or no profit upon the outlay.

Among the items of ordinary state revenue there are also some *Direct taxes.* One of these is the *Capitation tax*, a sum of 40 öre (about 5 d.) for a male and 20 öre (about 3 d.) for a female, paid by every ablebodied person over eighteen years of age. (Another tax of about the same amount *may* be imposed by communities for the common schools, and in some parishes certain fees, too, for the clergy; there is also a hospital fee charged by the County Councils; with the exception of these charges, personal taxes are now abolished in Sweden).

[1] Gross amounts save as regards railways. — [2] The amount paid in to the Exchequer Department only; another part of the net profit is assigned for new rolling stock, etc. — [3] For the year 1880, Supplementary grant, half as large as the ordinary amount, is included, cf. page 209. — [4] Part of the net profits; cf. page 209. — [5] The revenues and expenditures of the State *Telephone* are not yet included in the Budget estimates.

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The most important part of the ordinary State revenue, in earlier times was constituted by the so-called **Land taxes** (Grundskatterna), the abolition of which, however, has now been decided on and will be fully carried out by 1904. From ancient times, these taxes were a charge upon the land, but the nobility and the clergy were at an early period exempted in a greater or less measure from the payment of them for their estates. At length, the obligation to pay the tax or the exemption from it was fixed to each separate estate, independently of the rank and condition of the land-holder. Originally, these taxes were paid in kind and were, both in name and in rate, very different in different provinces. In course of time, they were assimilated under fewer and fewer headings, and, from 1869 inclusive, they have been paid in money at a fixed annual rate.

The abolition of the land tax was for a quarter of a century (1867/92) the most keenly discussed political question in the country. In 1885, its reduction by 30 % was resolved on, and, by enactments of 1892 and 1898, it was determined that during the years 1893/1903 the remainder should be by degrees entirely canceled. In its stead, an already existing tax on land will be levied on a larger scale; it is to be paid, not at a fixed rate, but according to the estimated value of the land (which is to be assessed anew every fifth year) and on the same basis for all kinds of landed property. This tax (the General Supply) belongs to the category of »extraordinary» state revenue, and is, therefore, treated of below.

Similar in many respects to the land taxes are a number of long-standing obligations to contribute certain payments in kind, devolving solely upon occupiers of certain classes of landed property. The most important of these burdens is the support of the army (the old system of **Indelta,** see above p. 205 and also p. 212). As we have seen, this obligation also is now abolished.

B) The so-called **extraordinary Revenue**, commonly termed: **Supplies** (Bevillningar), has since long ago been the most considerable source of national income. It consists of *Customs* and *Excise Duties* (on corn-brandy and beet-root sugar); also of *Stamp Duties* and *Postal Revenue;* and lastly of the so-called *General Supply* (Allmänna bevillningen), which is a direct property- and income-tax. This supply is voted for one year at a time, its rate being fixed upon after the other sources of revenue and the expenditures have been calculated.

As regards capital, labour, and civil or other service, the **General supply** is paid in direct proportion to the estimated *income* (to a certain degree, however, »progressively» — see below); as regards *real estate*, on the other hand, it is paid in proportion to its total value. The valuation of real estate takes place once every five years, of the income derived from capital and labour, on the other hand, every year. In both cases, the valuation is made as follows. Every community elects its own representatives, *Commissioners of Supply* (Bevillningsberedningen), who draw up suggestions which are examined and decided upon by representatives selected for larger districts, the *Assessment Committees* (Taxeringsnämnden). Complaints may be made against the decisions of the Assessment Committees, on the one hand by the tax-payers, on the other by the representatives of the Crown; such complaints are brought before the *Committee of Assessment Controllers* (Pröfningsnämnden), on which delegates from all the assessment committees in the Län have seats. In the last resort, an appeal may be made to the Audit Court in Stockholm.

That this tax in a certain measure may be called *progressive*, is due, firstly to all income below 500 kronor being exempt from taxation, and secondly to the circumstance that in calculating the tax there is deducted, from income of 500—

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1,200 kronor, a sum of 450 kronor; and from income of 1,200—1,800 kronor, a sum of 300 kronor. In towns where house-rent is particularly high, the said minimum and the deductions may be increased by a sum not exceeding 200 kronor. — As the most important *local* taxes are assessed on the same basis as the General supply, these also become in a certain measure progressive in character.

The General supply is now nearly always assessed at 1 % of the estimated income from capital or labour (with the above mentioned reductions), and at 6 öre per 100 kronor (before the abolition of the land taxes, three öre) of the value of landed estate, and 5 öre per 100 kronor of that of other real property. When an increase of taxation is rendered necessary, a so-called *Supplementary grant* (Tilläggsbevillning) is voted, from which the poorest grades of tax-payers are sometimes exempted.

C) Finally it remains to be mentioned that Parliament is in the habit of appropriating, for the needs of the Treasury, part (sometimes the whole) of the year's **Profits of the Bank of Sweden.** Most frequently, however, the Bank is allowed to retain part of these profits (or the whole amount) for the further development of its operations.

Usually the first item entered on the revenue side of the budget is the *Surplus* from previous years (which surplus is not generally considered available until after the lapse of a year). Of late years, the surplus has risen up to 20 million kronor and more, owing not only to the remarkably favourable economical conditions prevailing at present, but also to the fact that in making up the budget, the calculation of the expected revenue has always been made with the greatest caution.

The **national debt** of Sweden has, like that of other countries, had a history full of variations. During the nineteenth century, the kingdom of Sweden remained for a long time almost free from debt, and when — after 1855 — loans again were raised, this expedient was employed only to effect the construction of state railways. For this or similar purposes (as e. g. loans to private railways, for cultivation of land etc.) all subsequent public loans have been raised; thus, Sweden presents the rare example of a state whose entire national debt has been incurred for productive purposes, which under ordinary circumstances annually fetch the whole interest themselves. A summary showing the amount of the *Swedish national debt* during the two last generations is given in the following figures (a krona = 1·10 shill.):

At the end of	Total. Kronor.	Per inh. Kronor.	At the end of	Total. Kronor.	Per inh. Kronor.
1835	3,550,717	1·17	1870	116,675,827	27·99
1840	22,728	0·01	1875	140,146,936	31·97
1845	16,000	0·00	1880	230,356.239	50·45
1850	101,020	0·03	1885	247,069,595	52·76
1855	1,672,146	0·46	1890	259,512,599	54·23
1860	41,616,214	10·78	1895	287,505,967	58·44
1865	57,539,520	13·99	1900	337,898,733	65·78

The several bond loans constituting the present national debt are laid before the reader in Table 35.

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TABLE 35. *The Swedish National debt in bonds in 1900.*

Year of issue.	Kind of coin.	Rate of interest, %.	Primitive amount. Kronor.	Time of amortizement.	Eventual increase of amortizement.	Principal due as a debt 31/12 1900.
1880	£ sterling, Kronor, Francs, German Mark	3·5	119,790,000	1/4 1882— 1/4 1930	1900	97,029,900
1886	German Mark, Kronor	3·5	72,000,000	1/6 1887— 1/6 1961	1906	57,886,667
1887	Kronor	3·6	50,000,000	—	—	48,799,500
1888	£ sterling, Kronor, Francs, German Mark	3	26,666,667	—	—	25,111,111
1890	Ditto	3·5	35,555,556	1/3 1891— 1/3 1940	1900	32,371,555
1894	Ditto	3	36,000,000	Until 1950	—	18,000,000
1899	Ditto	3·5	72,000,000	15/11 1903—15/11 1953	1906	36,000,000
1900	Ditto	[1]4	36,320,000	—	1920	22,700,000
		Total	448,332,223	—	—	337,898,733

In proportion to the population, the present total of national debt — about 338 million kronor (19 million £) — is very low compared to that of most other countries. If in addition to this it is remembered that the Swedish government has at its disposal considerable funds, its financial situation may with good reason be termed exceedingly sound. In 1900 the *Assets* of the State were calculated at 648·7 million kronor (in which sum, however, are included certain donation funds only administered by the Exchequer Department); there is, besides, the real property of the State (estates and forests), valued at 254 million kronor. The country being in such financial circumstances, it is not surprising that it has remarkably good credit in foreign money markets.

The Army.

The Swedish army, though small in comparison with the huge armies of the Continent, has had a history far richer in glorious memories than the majority of other nations. There was an epoch when this army not only ranked highest in the military art of its age, but when, in all branches of the science of war, such as organization, armament, as well as regarding discipline, military efficiency in general, as also strategics and the method of waging war, it was a pattern to other armies: in fact, a pioneer in all branches of military science.

It was at that period when Gustavus II Adolphus — not only the greatest military genius of Sweden, but one of the very ablest generals ever known — marched victoriously through Europe. Undisciplined mercenaries, who served where they could get the highest pay, were then the only defense that the majority of states could rely upon. The contrary, however, was the case in Sweden — more than half a century in advance of other nations a really national standing army was initiated in time of peace. And discipline did not rest in this army,

[1] From August 16, 1910 inclusive, the rate of interest will be 3·5 %.

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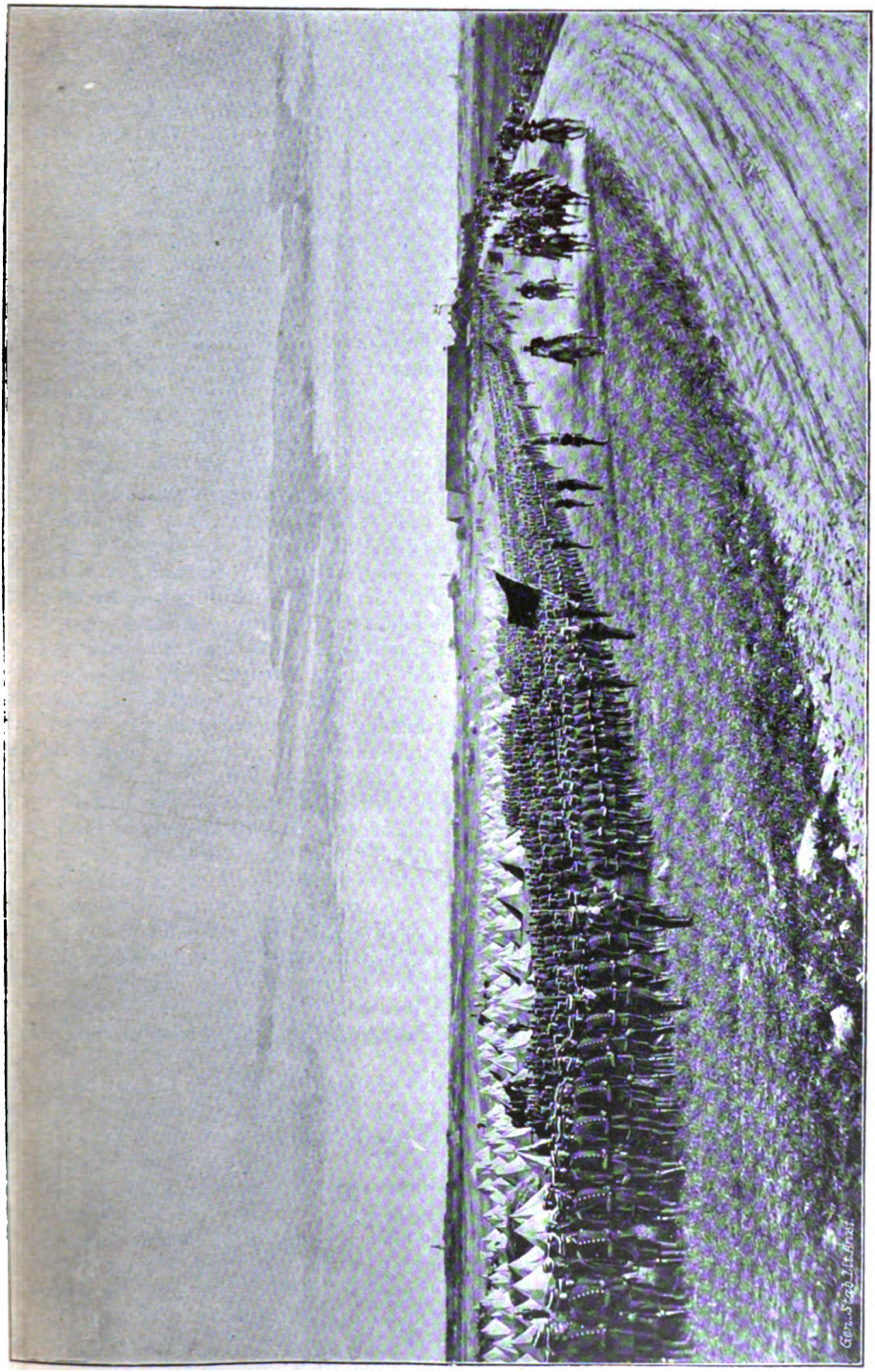

Photo. FRANS E. ARVIDSSON, Landskrona.

A General passing along the front of his troops.

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as among the mercenaries of that time, mainly on a fair allowance of pay, but on principles which are nowadays in civilized countries considered as right, that is on true military obedience, humanity, and the fear of God. As to understanding the importance of fire-arms, Gustavus Adolphus stood foremost, not only with regard to effecting technical improvements (lighter muskets, decreased calibre, paper-cartridges, cartridge-belts, artillery, quick-firing, etc.), but more especially in respect to the use of the new weapons. Completely abandoning mass-formations — an inheritance from the Middle Ages — the efforts of the Swedish army tended in the direction of thin and moveable battalions, and the cooperation of infantry, cavalry, and artillery. In other words, the first decisive step was taken in the direction of the development that tactical knowledge has ever since followed. So also with regard to strategics, where the traces of Gustavus Adolphus' creative spirit are perhaps more evident and profound than in any other part of military science. Instead of the aimless plundering-expeditions and improvised guerilla wars that, for more than a thousand years, characterized warfare, he was the first to reintroduce a *system* into it, thereby indicating the methods of the art of war for a century to come.

Under the reign of the three great Swedish Kings Charles X, Charles XI, and Charles XII, the system was followed up. The army was still foremost in the military science of its time, one foundation-stone being joined still more firmly to the other in the construction of the army system, and victory followed upon victory. The Swedes, however, were compelled little by little to abandon to others their *leading* military position in Europe. Sweden was mostly engaged in wars with her northern neighbours and these wars did not, to any considerable extent, affect the interests of Central Europe. Consequently, Swedish military operations no longer attracted the same universal attention as they had previously done. Doubtless the fame of Charles XII went round Europe, but his contemporaries, fostered in methodical wars of commissariat and fortresses, could not understand the magnificence of his rapid and decisive operations any more than the cavalry of this period, fighting in an antiquated manner, could see the meaning of the bold and powerful dashes of the Swedish horsemen. Many years had to elapse before the daring and plucky charges of the Swedish cavalry were destined to gain any greater recognition in Europe, and the storms of the French Revolution had to pass over our quarter of the world, ere men's eyes were universally opened to the real significance of the tactics introduced by Charles XII.

Since then more than two centuries have passed away. Changed political conditions have meanwhile acted upon the Swedish state and, naturally enough, also left their mark on the Swedish army; military activity is now only directed towards the object of defending the country. Even the new Army Act, which makes the army more efficient and which became law in 1901, aims at the very same object, viz., the maintenance of neutrality, and the protection of the freedom and independence of the Swedish nation.

Concerning the **organization** of the Swedish army, it is to be noticed that till now, in the Swedish army, at the side of the universal service, has been kept up a unique institution, which has been abolished only by an act of the Riksdag of 1901. This form of organization — peculiar to our country — was the so-called **indelningsverket** (military tenure), deriving its origin from the Swedish army organizations of the 17th century. The conscriptions during the many glorious wars of that century had been exceedingly burdensome, and a tendency more and more powerfully made itself known to get them exchanged for a fixed, unalterable service. These endeavours led to the army organization of 1683, by which the principle — in some measure applied already before — was ratified: that certain landowners, against the privilege of themselves together with their children and servants being released from compulsory enrolment for

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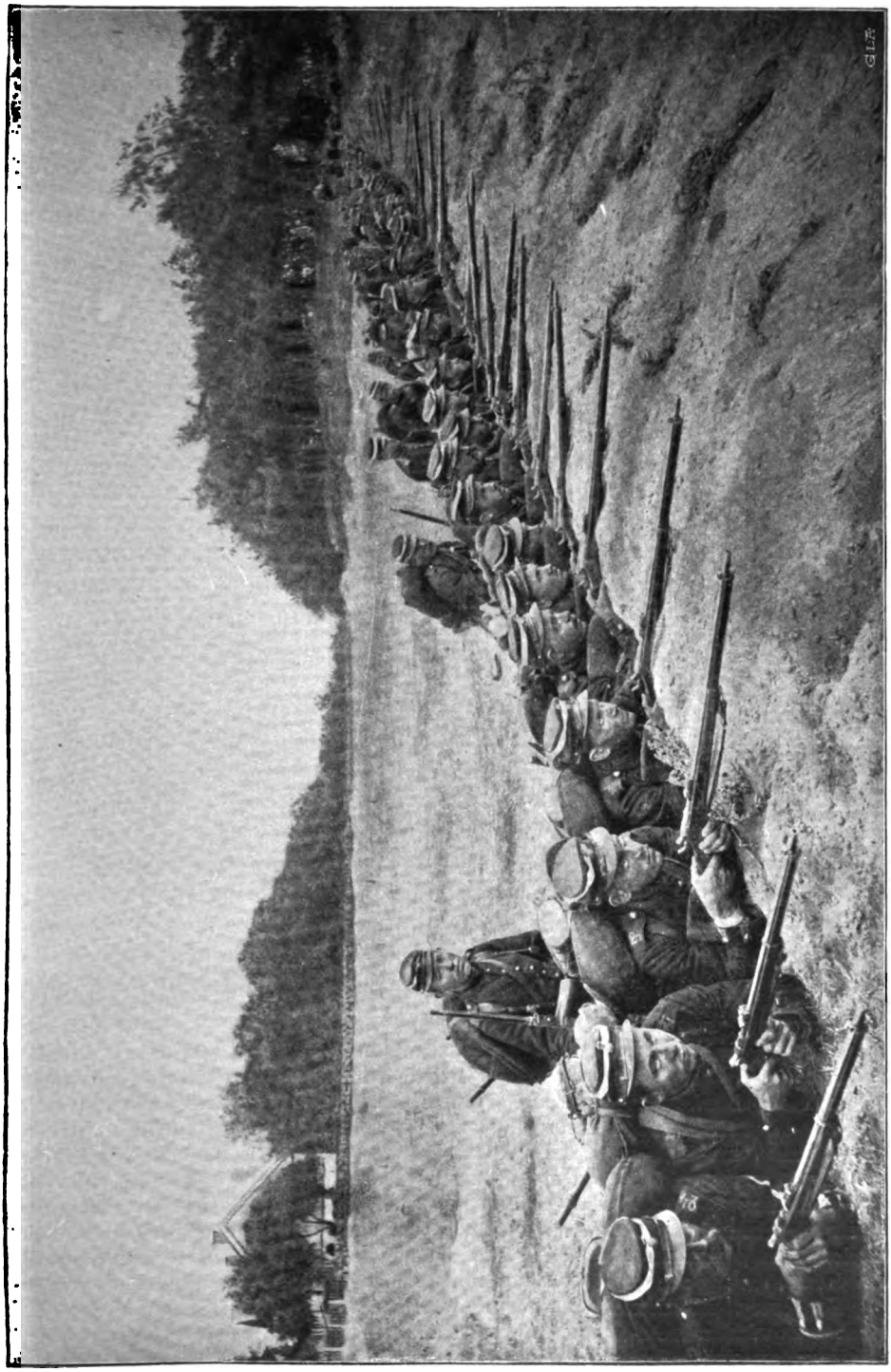

From the autumn-manœuvres 1899. Infantry: skirmish line.

Photo. FRANS E. ARVIDSSON, Landskrona.

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military service, should provide and sustain the *infantry regiments* stationed in the various provinces. The provinces were divided into equippers' locations (rotar), each of which had to provide and pay one soldier in time of peace as well as of war. The *cavalry* obtained an organization based on similar principles, in so far as the holders of crown land and others, against the benefit of certain privileges, entered into the engagement of procuring and maintaining a man and horse. — The tenement soldiers generally served for several decades. After having received their training as recruits, these men were only called in for the annual repetition drills. There still exists a rather considerable number of soldiers provided by the military tenure, a number, however, which year by year is diminishing.

The following is an account of the Swedish army after the effects of the new law of 1901 have been fully carried out. According to this law the Swedish army is organized on the principle of universal conscription and consists of the conscripts and the cadres of permanent employs (enlisted).

A) **The conscripts.** Every Swedish man is bound to serve as a soldier. There is no exemption whatever, nor is substitution allowed only those incapable of military service are released. A conscript, who has been *permanently* deprived of his civil rights because of having committed certain grave crimes, is not allowed to be a member of the army. If he has only lost those privileges *temporarily*, he is not allowed meanwhile to take part in military drilling, but is to be employed in suitable labour in the army.

Military service lasts from the calendar year in which the conscript will be 21 till the year (inclusive) in which he attains the age of 40. The time of service is thus 20 years, as a rule divided as follows: 8 years in the First levy, 4 years in the Second, and 8 years in the Reserves (Landstormen). Every man who has had constant employment (enlistment) in the army for a total period of two years belongs, after quitting the said service, to the first levy until the year when he enters the reserve (in his 33rd year) and performs his drills by way of repetition with conscripts belonging to his own year.

He who has, for at least two years, been a student of a University or at one of the high schools likewise belongs to the first levy until he enters the reserve.

The kingdom is **divided** into 26 regimental enrolment districts; every infantry regiment usually corresponds to such a district; the island of Gotland constitutes an enrolment district of its own. Every regimental enrolment district is subdivided into 3, sometimes, though rarely, into 2 or 4 sub-districts; Gotland's enrolment district has 8 sub-districts. There are altogether 82 sub-districts. Moreover, for the Navy there is an independent enrolment organization with 6 marine districts, each including 3—12 »Naval register offices». The chief of the corresponding infantry regiment, as a rule, serves as commanding officer to the enrolment district. The command of a sub-district is undertaken by an Army Reserve-officer, who is assisted by one or several non-commissioned officers from the Reserve.

For every sub-district or »Naval register office» there is a *committee of enrolment* with a field-officer as chairman, together with four members, viz., a lawyer appointed by the civil authorities, the chief of the sub-district, and

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two persons chosen by the County Council, who must be civilians. This committee or Board, which is assisted by a physician, does the enrolling, decides in questions of exemption and postponement, *examines* into the fitness of the enrolled for the different branches of the service etc. For every enrolment district, and Naval register office situated within the same, there is an *enrolment-revision*, consisting of the provincial Governor as president and four members, one of whom is the commander of the enrolment district, and three persons chosen by the County Council.

Infantry on snow-shoes (skidor).

This revision assisted by a military and a civil physician, *judges* complaints against the decisions of the enrolment committee, selects the conscripts for the different branches of the service, etc. No appeal can be made against the decisions of the enrolment revision. During that part of the year which falls between the meetings of the enrolment- and the revision committees, the commander of the enrolment district (Naval Enrolment district) performs the duties of the Enrolment committee for the enrolment of conscripts who have failed to attend the call, but such decision, however, must be submitted to the examination of the Enrolment Revision.

The enrolment of the conscripts takes place annually before the beginning of the drilling exercises in the year they attain the age of 21, and likewise of the elder conscripts who have been absent from previous enrolments or have obtained postponement of enrolment. Those liable to military service were, in 1900, as follows: The total of those of age for conscription was 67,528 men; from these were eliminated 6,427 men; 15,014 were absent, 12,130 exempted, 1,075 obtained postponements, while 32,882 were enrolled for military service.

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Of those *eliminated* 2,337 belonged to the permanent cadres (Stammen), 806 sailors were entered twice, and 3,284, incorrectly entered. Of those *absent* 249 had lawful cause, and 71 had, with the consent of the authorities, removed from the kingdom; the remainder — 14,694 — were absent without any legitimate cause, amongst whom were 6,903 of the age of 21, and 7,791 were older. *Postponements* were granted in 889 cases on account of ill-health, and in 186 cases for family reasons.

Of the 32,882 enrolled 27,258 were of the age of 21, 2,742 were older, and 2,882 were younger. They were distributed as follows: 720 were assigned to the cavalry, 1,298 to the field and horse-artillery, 463 to the fortress-artillery, 410 to the engineers, 3,218 to the army service corps, and 3,294 to the navy; the remainder — 23,479 men — were assigned to the infantry.

The training of the conscripts. The conscript is, after enrolment, bound to serve in time of peace: *a*) in the infantry, position-artillery, fortress-artillery, fortress-engineers, and the army service corps, a total of 240 days, which service is to be performed during the first period of service (recruit- or drilling-school) for 150 days during the second year and with a repetition-course for 30 days during each of the second, third, and fourth years; — *b*) in the cavalry, field-artillery, field-engineers, and field-telegraph troops a total of 365 days, which service shall be performed during the first period of service (recruit- or drilling-school) for 281 days, which begins during the first year and with a repetition-exercise of 42 days during each of the second and third years.

Certain conscripts, assigned to the army service corps or to special occupations in the army, also the mainland conscripts, who are exercised on the island of Gotland, perform their military service in one year.

Those conscripts who belong to the first or second levy and who have not served during the course of the year, must be mustered in their home districts, which review is carried out in each enrolment district towards the end of the year. As a rule they have to attend personally at the muster.

Probably the conscript service mentioned under *a*) will, in time, be extended.

B) **The enlisted soldiers.** These soldiers are chiefly recruited for the purpose of becoming corporals and the giving of stability to the special branches of the service, for which reason the choice must be made with care. Conscripts are preferably accepted after having gone through the training as recruits. The enlisted soldiers are bound to serve for several years, during which time they pass the corporals' and non-commissioned officers' schools.

C) **Non-commissioned officers** are educated and drilled in special schools. Including the recruit-school, the military education of a corporal requires about 2 years and that of a non-commissioned officer, about 3 years.

D) **Officers.** Those who aspire to become officers, must have passed an examination qualifying them as students of a university. After having passed through a 3 months' recruit-school in summer

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they must go through a 10 months' training school, after which they take part in the regimental drills and, in autumn, enter the Royal Military School, where the course lasts for about 15 months. Thus the military education for those who count to become officers takes a time of about 2½ years. The average age for obtaining the rank of an officer is 21·7 years. Some more than 100 officers are annually appointed. Promotion up to the rank of captain takes place, as a rule, according to *seniority* in the regiment, to that of major and the higher grades, by *selection* within the particular branch of the army or the general staff.

Group of Infantry Officers and men. Photo. FRANS E. ARVIDSSON, Landskrona.

For promotion to the rank of lieutenant at least two years' service as an officer is required, and, moreover, for cavalry-officers to have passed the cavalry riding-school (10 months) and for artillery- and engineer-officers to have passed the ordinary course (16 months in 2 years) at the Artillery College. For promotion to the rank of a captain of the engineers it is necessary to have passed the higher course at the Artillery College (15 months, apportioned in 2 years). For the training of Staff officers as well as for raising the standard of scientific knowledge amongst the whole body of officers there is a Staff College (19—20 months in 2 years). — The other establishments for the further education of officers are the Gunnery Schools of the infantry, field-artillery, and fortress-artillery, and also the Central Gymnastic Institute.

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In order to obtain a *pension* a period of 30 years' service is necessary, and the age is for a general 65, for colonels 60, lieutenant-colonels and majors 55, and for captains 50 years. Those who are entitled to a pension are obliged to retire from active service as soon as they have exceeded the fixed age by 3 years.

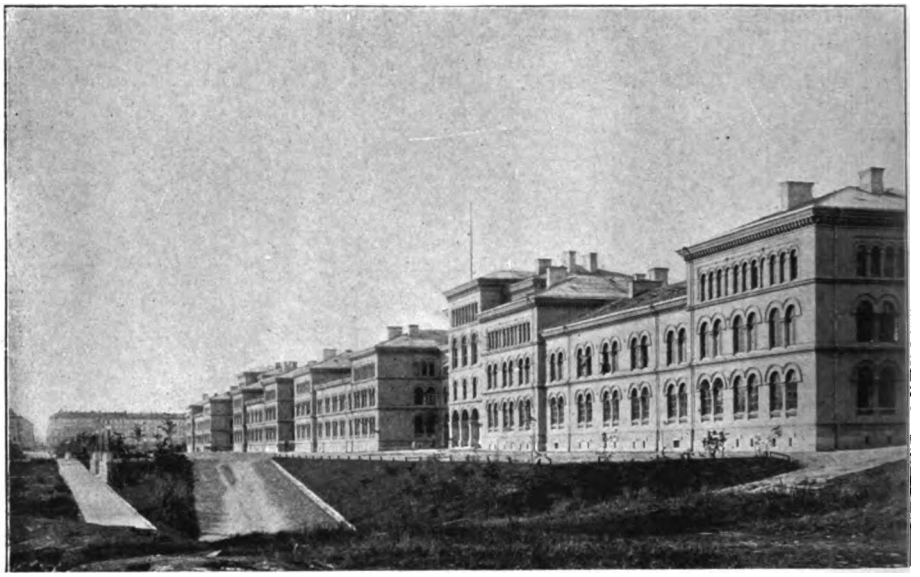

Photo. G. Fr. Klemming, Stockholm.

Barracks of the foot guard regiments at Stockholm.

Organization of the army in time of peace. The kingdom is divided into 6 army-divisional districts besides the island of Gotland, which forms a military district of its own.

The following gives a summary of the organization of the army-divisions in time of peace:

Army Divisions.	Head Quarters.	Infantry.		Squadrons.	Field Artillery batteries of 4 guns.	Horse Artillery batteries of 4 guns.	Field-howitzer batteries of 4 guns.	Position-gun batteries of 4 guns.	Fort Artillery companies.	Engineer companies.	Army service-corps companies.
		Regim:ts with 3 battal:s.	Regim:ts with 2 battal:s.								
I Army Div....	Helsingborg.	4	1	25	9	3	2	—	—	1	3
II » ...	Linköping...	4	—	5	9	—	2	—	—	—	3
III » ...	Skövde.....	4	—	5	9	—	2	—	4	4	3
IV » ...	Stockholm...	4	1	5	9	—	2	6	—	7	3
V » ...	Stockholm...	4	—	5	9	—	2	—	—	—	3
VI » ...	Hernösand...	5	—	5	9	—	2	—	6	4	3
Gotland troops...	Visby.....	1	—	—	2	—	—	1	—	—	—
	Total	26	2	50	56	3	12	7	10	16	18

The strength of the army *in time of peace* appears in Table 36.

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TABLE 36. *The Army's strength in time of Peace.*

Troops.	Officers.	Non-commissioned officers.	Band.	Corporals.	Officer-aspirants.	Other Enlisted soldiers.	Civilian Officials. Of officer's rank.	Civilian Officials. Of subordinate rank.	Total of the cadres.	Conscripts recruits.	Horses. Officers'.	Horses. Regulars'.
General officers, general staff, and other employs ..	61	—	—	—	—	—	206	107	374	—	121	—
Infantry.												
1 field-infantry regiment	47	38	37	142	12	125	5	1	407	600	9	—
22 d:o d:o	1,034	836	814	3,124	264	2,750	110	22	8,954	13,200	198	—
1 guards reg:nt ...	47	38	37	154	12	365	5	1	659	600	9	—
1 d:o d:o ...	47	38	37	154	12	365	5	1	659	600	9	—
1 fortress d:o ...	34	26	25	103	8	84	4	1	285	600	7	—
1 d:o d:o ...	34	26	25	103	8	84	4	1	285	600	7	—
1 reg:nt on Gotland	50	39	29	128	10	244	5	1	506	600	9	—
Cavalry.												
1 cavalry reg:nt..	27	16	16	91	6	201	6	1	364	150	56	600
5 d:o d:o ...	135	80	80	455	30	1,005	30	5	1,820	750	280	3,000
1 d:o d:o ...	54	31	31	182	12	402	8	2	722	300	111	1,200
1 d:o d:o ...	54	31	31	182	12	402	8	2	722	300	111	1,200
Artillery.												
1 field-artillery regiment	55	45	21	186	18	144	6	—	475	385	10	440
4 d:o d:o	220	180	84	744	72	576	25	—	1,901	1,540	40	1,760
1 d:o d:o	66	56	24	237	20	183	6	—	592	490	12	584
1 artillery corps..	21	13	6	74	4	73	2	—	193	170	3	85
1 heavy artillery regiment.....	34	36	13	102	14	78	5	—	282	390	5	60
1 land fortress artillery reg:nt....	55	60	17	162	16	138	6	—	454	400	7	—
Ordnance Store artillery	—	—	—	—	—	—	21	111	132	—	—	—
Engineers.												
Staff of four corps	122	108	39	252	15	317	31	22	912	500	26	143
Army service corps.												
1 corps	15	18	8	47	2	26	6	4	126	260	1	54
5 d:o	75	90	40	235	10	130	30	20	630	1,300	5	270
Total	2,293	1,805	1,414	6,857	557	7,692	534	302	21,454	23,735	1,036	9,396

In the repetition-exercises about 60,000 conscripts take part every year.

The army in time of war. On the proclamation of war the army is brought up to its full fighting strenght by calling in the required number of conscripts. In the field the higher units will probably be given the following organization: An Army division: 2 infantry brigades of two regiments of 3 battalions; 1 cavalry regiment of 4 squadrons, 1 field-artillery regiment, 1 company of field-engineers, 1 pontoon

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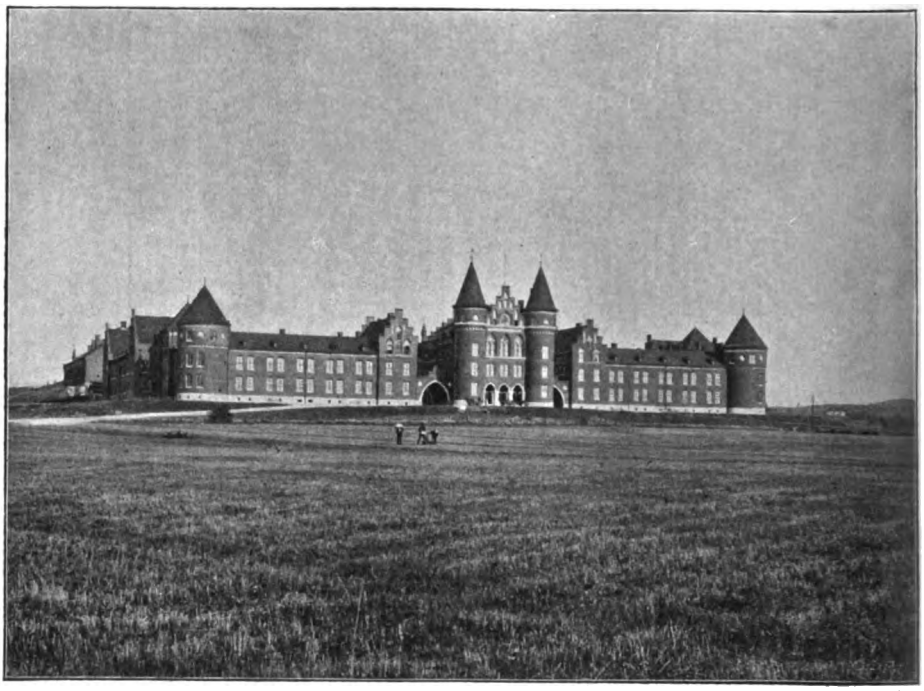
column, 1 field-telegraph detachment, 1 medical service company, 2 artillery and 2 infantry ammunition columns, 4 supply columns, 1 butchers' and bakers' company, 4 field hospitals and 1 horse depot. The Cavalry division: 2 brigades of 2 battalions of 4 squadrons respectively, 1 brigade-division of 3 batteries of horse-artillery, 1 field-telegraph-detachment, 1 medical service detachment, and half an ammunition-column.

Besides this reserve- and depot-units are organized as well as the general reserve (landstorm).



Barracks of an artillery regiment at Gothenburg.

At the present time (1902) we may estimate the total number of regular soldiers and trained men bound to serve in the army in time of war at about 500,000, viz., in the standing army 39,000, the conscripts' 1st levy 182,000, and d:o 2nd levy 75,000, and the general reserve (Landstorm) 204,000. In the first call of the conscripts 17,800 are registered as having served in the permanent cadres.

The infantry is **armed** with a repeating rifle of the **Mauser** system with a calibre of 6·5 mm. The cavalry carries a sword and a carbine of the above mentioned pattern. The field-artillery's guns have a calibre of 8·4 cm; the horse-artillery batteries have 7·5 cm quick-firing cannons. At the present moment quick-firing guns are also being tested for the field-batteries.

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The fortresses are: Stockholm (Vaxholm—Oscar-Fredriksborg), Boden, Karlsborg, and Karlskrona, to which must be added some forts at Gothenburg and on the island of Gotland.

Voluntary service and rifle-associations. In the beginning of the sixties in the last century the idea of raising *volunteer-forces* in Sweden was born. Local volunteer-corpses were formed and the interest for the new movement was so great, that in the year of 1864 no less than 40,000 volunteers had come forward. However, the new organization was badly managed from the beginning. The pretentions were too great, as one expected to be able to use them as a kind of reserve of volunteer-troops. The enthusiasm soon vanished and the movement gradually died away. In 1878 the system was altered and the Government decided to aid financially only such voluntary service as had in view a better and more widespread rifle practice. Nevertheless the movement lacked a sound organization and direction, and the interest for it was altogether failing.

But about 1892 a change for the better took place and more energy was displayed. The whole system was reorganized in 1893 and after this the nation has shown its interest and goodwill in joining in the movement. The principal outlines of the new organization are as follows: In towns, villages, and parishes, where interest for voluntary local defense prevails, rifle-clubs are formed and an administrative committee is chosen by the members themselves. According to local circumstances subdivisions of the clubs may be formed. Several clubs, belonging to the same Län, form a *rifle-association* which has a special direction, whose members are the presidents of the foresaid committees. The Government appoints special officers who have to supervise that the work is carried on in a satisfactory manner.

The organization in general is under the superintendence of a Central Board consisting of a general director and 24 members, elected by delegates from the rifle-associations, besides 3 or several officers, appointed by the Government. The Central Board elects an executive sub-committee, in which the above mentioned officers are to be members. The delegates of the rifle-associations hold at least one annual meeting. At this meeting, in which the members of the Central Board partake, all questions concerning the work of the associations and rifle-clubs are discussed, likewise all questions that are to be decided by the Government. Every year a programme for the voluntary rifle-practice in accord with the regulations for the army is issued by the Government.

Since the commencement of the movement, the Governement has tried to encourage it by granting money and by lending rifles for nothing to the clubs; of late, distinctions in bronze, silver, and gold have been distributed for good practice. At present the annual grant from the State is 400,000 kronor, which is chiefly used by the rifle-clubs for procuring ammunition and prizes and for paying instructors, and by the rifle-associations to pay the expenses of administration, for prizes at certain competitions and for laying out rifle-ranges. — Since the reorganization of the rifle-associations, the enthusiasm for the movement has increased among all classes. The 31st of December 1901 there existed in the country 1,334 rifle-clubs with 91,377 members, of whom 85 % were liable to conscription service; for practising there were at the same time 1,700 rifle-ranges. In 1894 there were 1,500,000 rounds of ammunition fired at the rifle-club-ranges, and in the year 1901 about 6,220,000 rounds.

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The Navy.

The Swedes have since the most ancient times been a seafaring nation. During the age of the Vikings the people of the North had the greatest naval power of the world. But this formidable power was soon broken up, and, with regard to Sweden particularly, it came to such a pass that, at the close of the Middle Ages, it had no navy at all. In later times the fortunes of our naval defense have been very much varying. But in our days a lively interest for its strengthening has been awakened and already borne good fruits.

Gustavus Vasa (1523/60) is rightly called the *creator of the modern Swedish navy*. The development of the navy was effected under his own vigorous personal guidance. Erik XIV, his son, kept up the work, and the Swedish navy became during his time the most powerful of all the navies of Northern Europe. After his time, however, it was very much neglected.

The inefficiency of the navy and its stationing at Stockholm caused great damages to the country during the war with Denmark 1675/79. The establishment of Karlskrona as naval station, and the speedy improvement of the navy during the later years of Charles XI, were the direct results of this. At the beginning of the 18th century, Sweden had a navy of no less than 45 rated vessels besides smaller ones. The steadily growing financial difficulties during the later part of the reign of Charles XII made it, however, impossible to maintain such a force.

When peace, after the death of Charles XII, had been re-established, the naval defense was well cared for by government and parliament. Beside the regular naval fleet a powerful fleet of various vessels grew up with certain types of vessels peculiar for Sweden and adapted for its many archipelagoes. Sveaborg became the chief station and basis for this fleet. Both fleets were, especially during the reign of Gustavus III, re-inforced to such a degree that Sweden in the war with Russia 1788/90 could send 26 ships of the line, 12 large frigates, and more than 350 smaller vessels against the enemy. These were manned with about 44,000 men and carried more than 5,000 guns. The losses during the war were great, however, and the Swedish navy has never since regained the same strength.

Up to the middle of the 19th century Sweden maintained two fleets of quite a respectable power and quality. Then occurred the great and rapid changes in vessels and material used in naval warfare by which so many of the smaller states were left powerless. Sweden procured some ironclads of small type and some gunboats between 1860 and 1880, but this was much too small a compensation for the old fleets, particularly when it is considered that the personnel of the navy at different times had been very much reduced.

In 1882 a committee of the parliament agreed upon a new type of ironclads of greater dimensions and seaworthiness, greater speed, and more powerful armament. Since then the naval defense of Sweden has again commenced to improve, very slowly up to 1895, but after that year and particularly through the decision of the parliament of 1899, more rapidly, and can with some certainty be calculated to become adequate to the defense that it is intended for within a few years.

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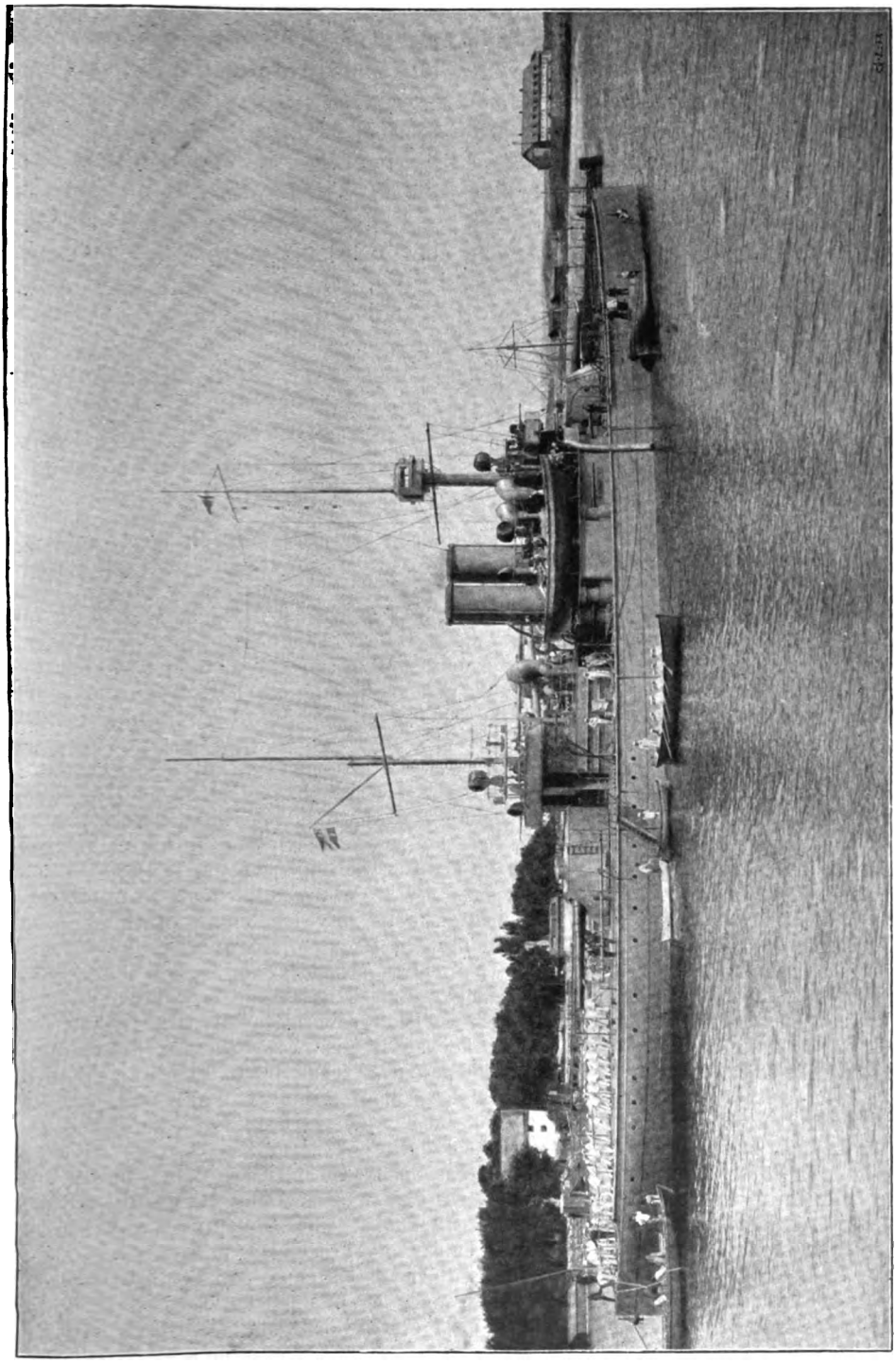

The Thor, 1st cl. coast defense vessel.

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The fleet of the Swedish navy consists at present of the following **vessels,** those building and granted included. The *flagship* or *royal yacht* Drott of 630 tons. *Fighting-ships:* 11 ironclads of the first class (The Svea, Göta, Thule, Oden, Thor, Niord, Dristigheten, Äran, Vasa, Tapperheten, and Manligheten) each of from 3,100—3,650 tons; 4 second class ironclads of 1,500—1,600 tons; 7 third class ironclads of 460 tons; 5 torpedocruisers of 800 tons; 9 first class gunboats of 500—640 tons; 1 second class gunboat of 280 tons, 1 destroyer, 15 first class torpedoboats of 67—90 tons; and 11 second class torpedoboats of 40—50 tons. *Training and schoolships:* 4 corvettes of 1,500—2,000 tons, 4 second class gunboats of 190 tons; 1 repair-ship of 175 tons; 6 schoolships of 80—312 tons; 6 receivingships, and 3 small steamers.

The total displacement of the fighting-ships of the fleet is about 60,000 tons. The number of *guns* on these ships is 315, viz. 38 heavy, 93 secondary weight (of these 71 rapidfiring) and 184 light guns (all rapidfiring). The number of magazineguns is about 100 and of torpedotubes, 64. The sum of indicated *horsepowers* is about 110,000.

The ironclads of the first class make the main body and chief strength of the navy. They correspond nearest to the coastdefense vessels or fourth class battleships of the larger navies, but they are of more modern construction than most of these. Their chief dimensions are: length 75—89 meters; width 15 m. and draught 5 m. They are all built of steel with double bottom and supplied with armourplates, 20—29 cm. thick, extending over more than half of the entire length; armoured deck 5 cm.; turrets for the heavy guns of 15—29 cm. armour; casemates or smaller turrets of 10 cm. armour for the secondary guns. — The armament consists of 1—2 heavy guns (25 or 21 cm.), 4—7 secondary guns (15 or 12 cm. rapidfiring), 10—11 light guns (57 mm. rapidfiring). Torpedotubes are placed on board, generally under the waterline. All but two of these vessels have rams. Two independent engines of together 3,640—6,000 horsepowers (on the older compound horizontal, on the new ones triple expansion vertical engines) give them a speed of 14·7—16·5 knots. The ship's company is 232—282 men. — The *second* and *third class ironclads* are of the wellknown monitortype.

The torpedocruisers correspond nearest to the torpedocatchers of the English navy from the time of 1880. They are intended for scouting, but are hardly fast enough for this purpose (19—20 knots). Their chief dimensions are: length 68—73 m., width 8 m., draught 3 m. Engines and boilers are placed below the waterline and are protected by a light armoured deck (2 cm.). The armament consists of two 12 cm. and four 57 mm. rapidfiring guns. Below the waterline is a bow-tube for 38 cm. torpedoes. The ship's company is 99 men. The *destroyer* is building at Poplar (Yarrow).

The gunboats are hardly of any value as fighting ships, but are well adapted for training in the archipelagoes. One of them, Svensksund, serves besides as icebreaker and salvage vessel. The *torpedoboats* are much like those of other navies. The nine latest built are of 90 tons displacement (length 39, width 4·8, and draught 2·1 meters), have one fixed and one moveable torpedotube, two 47 mm. rapidfiring guns, and a speed of 23 knots. The older ones are smaller and make about 18 knots. The ship's company is 17 and 13 men.

All the vessels are built in Sweden (with the exception of three torpedo-boats), the ironclads of the first class at Bergsund, at Lindholmen, and at Kockum (Malmö); those of the second class and most of the third class at Motala wharf; a few gun- and torpedo-boats, at the navy-yard in Karlskrona; others at Stockholm.

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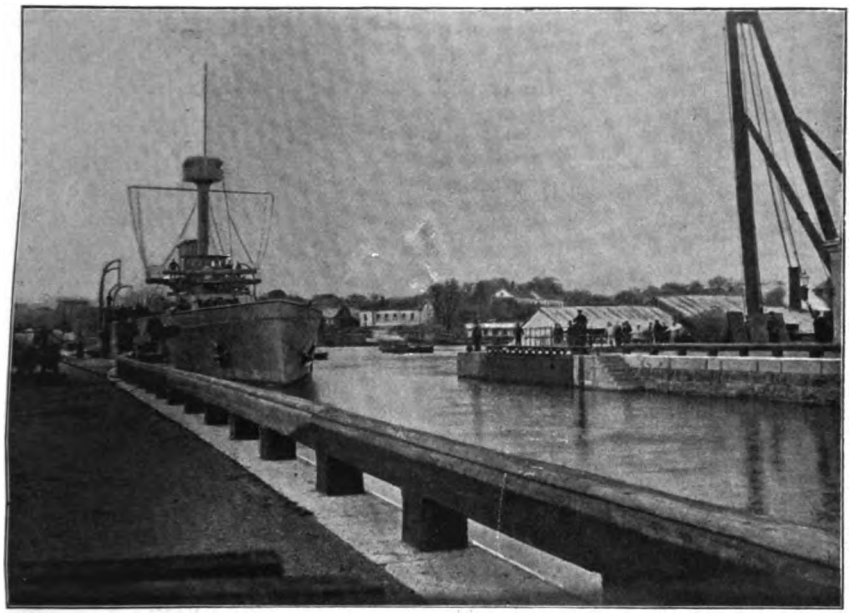
The administration of the navy is effected by the Royal department of the Navy with its »command expedition», the Naval Department, and the General Staff of the Navy, all stationed at Stockholm. The Minister for the Royal department of the Navy is, next to the King, the highest chief of the navy. The department directs all matters which according to the constitution belong to the navy, with exception of matters of command which belong to the »Kommandoexpedition» of the department.



The Navy yard at Stockholm.

The *Admiralty* is a collegial office, which under the Navy department administers technical and economical matters belonging to the navy. It consists of one chief (admiral) and six members (three commodores or captains, the chief of the mining defense, the chief constructor of the navy, and one counselor), who are the heads of the six divisions of the Administration: those of intendancy, of artillery, of torpedoes, of mines, of construction, and the civil division. In the administration are besides employed several officers, marine engineers, and civil functionaries.

The General Staff of the Navy, organized in 1896, is under an admiral and works on two divisions: that for mobilization and statistics, and the one for communications, each under its chief (commodore or captain) and with about fifteen officers together.

The personnel and material of the navy are disposed at **two stations:** Karlskrona and Stockholm, each under a commander-in-chief. Under him subordinate: 1 chief of the non-commissioned officers and sailors, the chiefs of the schools of the station, 1 educational committee, 1 administration office, officers of hygiene and sickrelief, 1 court-martial and others.

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The commander-in-chief at Karlskrona is also commander of the fortifications.

To each station belongs a *navy yard*, the director of which subordinates directly under the Admiralty. The work of the yards is divided in five sections: the departments of artillery, torpedoes, mines, equipage, and engineers.

Control over and account of money, proviant, clothing etc. are left to the counting office of the station consisting of most of its civil functionaries.

The personnel of the navy consists of a cadre, reserve, and conscripts, and is divided in the following corpses and bodies: *a*) military corpses: officers (and midshipmen), non-commissioned officers, sailors, and boys; *b*) civil-military-bodies: marine engineers, the civil staff, the ecclesiastical staff, the medical staff, labourers, and policemen.

The active personnel of the **corps of officers** consists, according to the budget, of 210 officers, viz. 3 admirals, 7 commodores, 14 captains of 1st rank, 15 of 2nd rank, 75 commanders or lieutenant-commanders, 65 lieutenants, and 31 sublieutenants. Naval officers are recruited from the corps of midshipmen, which is trained for 6 years in the *Naval College*, during winter in Stockholm and in summertime (4 months) on board ships (1 corvette, 1 gunboat and 1 torpedoboat). The age of admission is between 13 and 16. The training is superior to that of most other navies both as to theory and practice. With regard to theoretical training this holds good also of the officers, as they pass through not only training schools in drill, shooting, signaling, and the handling of mines and torpedoes, but also a two years' course at the *Naval Academy*. The very important practical service at sea is, however, not so well cared for as might be wished. But this is soon going to be remedied. — Officers belonging to the naval *reserve* are of four categories, together about 180 persons. Most of them are reserveofficers belonging to the mercantile marine, who have passed a years' course at the schools of the navy with or without shorter courses of repetition.

The corps of **non-commissioned officers** consists, according to the budget, of 120 warrant officers, 242 petty officers or together 362. The non-commissioned officers are enrolled on eight staffs: gunners, boatswains, mates, miscellaneous, engine-room-artificers, artisans, torpedo-chief-stokers, and carpenters. For appointment as non-commissioned officer it is required to pass a special examination and to have served $1^1/_2$ to 2 years as quartermaster. The non-commissioned officers of the reserve are about 90 in number.

The common men of the navy consist of the corps of sailors, the corps of boys, and the conscripts of the navy. The corps of sailors of the old system of distribution of the army and navy, which had existed over 200 years, became gradually vacant after the change in organization of 1888. Since then the organization of the navy men has undergone several changes, and a satisfactory recompensation for the old sailors has not yet been reached. According to the organization adopted for 1902

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the corps of sailors shall count 2,825 men, divided in 16 companies. The corps is filled partly from the corps of boys (generally at the age of 18 or 19), and partly by voluntary enlistment for a time of $2^1/_2$ to 6 years. Re-engagement for 2 years at a time is generally permitted and becomes obligatory after each passed examination in the schools for non-commissioned officers.

The Naval College at Stockholm.

The men of the *corps of sailors* are distributed on four branches: executing-branch, miscellaneous, engineer branch, and artificer branch, and are trained for 13 different occupations.

The corps of boys counts, according to the budget, 400 numbers in two companies. The age of admission is between 16 and 18, and the training takes two years, during wintertime in a school at Karlskrona, in summertime on board sailing trainingships.

The conscripts for the navy embrace partly men engaged during the old organization, who remain in the first call of the conscripts up to the age of 32, partly all stokers of the mercantile marine, and all seamen who when they reach the conscript age, have served in foreign navigation for 12 months, and partly others, selected among the main body of conscripts. The conscripts are to be trained at sea (from 1903) during 172 days and from 1908 during 10 months. The number of conscripts is about 17,000, and about 1,600 are trained each year.

The civil-military personnel has 24 constructors and engineers, 76 accountant officers and paymasters, 8 clergymen and teachers, and 36 surgeons. The labourers (paid by month or day) consist of a sufficient number of mechanics and tradesmen of different kinds, generally employed in the navy-yards.

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The training of the personnel (besides midshipmen and boys) is brought about, partly in schools, on shore, and on board ship (drilling, torpedo, and signaling schools, and schools for non-commissioned officers), and partly in squadrons at sea, which, during the last years, generally have been made up by one squadron of 3 first class ironclads, 4 to 6 torpedocruisers or gunboats, and 8 torpedoboats for a time of 3 months; one squadron of 4 smaller ironclads, 1 gunboat, and 4 torpedoboats for a time of 6 weeks or 3 months; and 2 trainingcorvettes for 3 to 7 months.

To the navy department belongs furthermore from Jan. 1, 1902 the entire **Coast-Artillery,** which garrisons all the fortifications at the sea-board. It consists of two coast-artillery-regiments, that of Vaxholm, and that of Karlskrona, from which detachments are sent to Gothenburg and to Fårösund. When complete, the coast-artillery will consist of 100 officers, 154 non-commissioned officers, and 1,314 men, besides a large number of conscripts. A general is chief of the coast-artillery, and the regiments are formed in about the same manner as those of the army, the different companies, however, consisting of artillerymen, miners, and miscellaneous.

The Administration of Justice.

Like all the more important sections of Swedish law, that relating to legal procedure in the courts is essentially based on a national foundation. The principal part of the body of laws in force at the present day consists of the **Code of 1734,** the terms of which may be regarded as having been evolved after a protracted course of development independent of foreign influence. The history of the methods of legal procedure in the courts of justice in Sweden is not marked by any of those revolutionary changes that have taken place in several other countries. Thus, the jury-system, that made its entrance so triumphantly elsewhere, has practically not been accorded any welcome in Sweden, for another mode was early adopted for affording laymen an opportunity of having a share in the administration of justice; nor have there existed in Sweden, to the same extent as in other countries, causes rendering the adoption of the jury-system desirable, such, for instance, as the subservience of the administration of justice to political considerations, or that highly unpractical and unintelligible procedure in which cases tried in the courts have traditionally had to be conducted. The principles underlying the time-honoured methods of legal procedure seem still to exercise so firm a hold upon the minds of the public that an attempt to bring about any radical reform on the analogy of the institutions of other countries would meet with but little chance of success.

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In Sweden, as elsewhere, a distinction is made between *General* and *Special Courts of Justice.* During the course of the 19th century the Swedish system of judicature has been not immaterially simplified by the abolition of several courts, whose jurisdiction was limited in one direction or another, numbers of important branches of juridical business being at the same time transferred from other authorities to the purview of the Courts of Justice. The General Courts of Justice are all of them resorts both for criminal and civil cases. Special *Petty Courts of Justice* (so-called Bagatelle Courts) for matters of less moment are unknown. They may be said, however, to have some sort of counterpart in the Police-Courts, established in certain of the larger towns — such courts having jurisdictional powers conferred upon them.

As regards lower courts of justice, *a town forms a jurisdiction quite apart from that of a rural district.* This distinction of town from country dates from the time before the enactment of the Code of 1734; then rural districts and towns were governed by separate laws.

The *country* as distinct from the towns is divided into 119 judicial districts, termed *Domsagor*, each with a *District-judge* (Häradshöfding). A Domsaga may consist of two ore more subdivisions, so that the actual number of judicial divisions (Tingslag) is at present 261. Each Tingslag has its **District-court** (Häradsrätt), that being the ordinary lower court of justice. Such a court is constituted by a duly qualified legal official in the person of the District-judge (see above) who presides, and of twelve unsalaried jurymen (Nämndemän), chosen by public election, who assist in the proceedings.

The *Nämndemän*, of whom at least 7 must be in attendance, are called upon to assist the District-judge in deciding upon both legal and practical questions. When a difference of opinion arises, the vote of the judge is decisive, unless all the nämndemän present are unanimous on the other side. The above statement, however, may be misleading in so far as the reader will scarcely be likely to deduce from it an adequate idea of the real extent of the influence accruing to the nämndemän; an influence largely due to their accurate knowledge concerning persons and affairs in their locality. This is especially marked where — as is very often the case — the nämndemän have gained experience also in the routine business of the court by virtue of many years of service. It may, therefore, be unhesitatingly averred that the lay element in the district-courts makes itself very effectively felt, being not only a valuable addition to the deliberative strength of the court itself, but a surety in the eyes of the general public for the justice and humanity of the decisions there arrived at. — The *legal element* in these district-courts is also possessed of a greater degree of authoritative strength than might be imagined by any one who was casually informed of the composition of the same. The position of District-judge is a highly esteemed one; as it, moreover, carries with it a relatively speaking large salary, such a position attracts well experienced, and not infrequently highly distinguished, lawyers. It is the custom, furthermore, for a new-fledged lawyer, fresh from his studies at the university, to spend two or more years in the employ of a district-judge, that he may thereby acquire practical experience of juridical procedure; during this period of his apprenticeship, which has come to be looked upon almost as an obligatory part of his training, he will discharge, in his own person and on his own responsibility, the duties of his chief for a period of at least some months, covering a number of sittings of the court.

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One decidedly weak point in the district-courts is that the ordinary sessions are even in the most favourable cases too few and far between; extra sessions are appointed to be held, it is true, for dealing with cases of personal arrest, among other things. The inevitable delay in the administration of justice that the infrequency of the sessions entails is further enhanced by the difficulty that exists, owing to a variety of circumstances of both judicial and practical character, in effecting that concentration in the conduct of legal proceedings that would be so great a boon to all parties concerned.

In a *town*, justice is administered in the first instance by the **Town-court** (Rådstufvurätt), which in the larger towns is divided into two or more divisions, each being empowered to pass judgment alone. The members of the Town-court, who form at the same time the ordinary administrative authority of the town (termed magistracy), are three in number: the *Mayor* (borgmästare) and at least two *Aldermen* (rådmän). These officials are salaried by the town and are instituted to their offices by election; the aldermen in Stockholm and all the mayors are appointed by the Government, the choice being, nevertheless, restricted to a list of three duly qualified persons elected as candidates by the town.

The members of a Town-court, with the exception of some aldermen in certain of the smaller towns, are all professional lawyers. In certain *cases falling under Maritime Law*, the constituent membership of the Town-court consists of three ordinary members and of three experts, these latter appointed by election; nowadays a similar arrangement is also to be met with in certain cases with regard to patent rights. Members of a Town-court always enjoy individual votes of equal value. By reason of the manner of appointment, as above detailed, it follows that the personal qualifications of the members will in general be higher, the larger the constituency which elects them. The Town-court meets at least once every week.

In cases touching upon the liberty of the press, the question of whether the publication arraigned is libelous or not is decided by a *Jury*. Three out of its membership of nine persons are nominated by each of the parties to the suit, the remainder by the court. For sentencing, at least six votes are required.

The general tribunals of the *second instance* are the three **Courts of appeal** (Hofrätter), viz. Svea Hofrätt in Stockholm, Göta Hofrätt in Jönköping, and the Hofrätt for the provinces of Skåne and Blekinge in Kristianstad. Each of these Courts is constituted by a *President* together with a number of *Judges of appeal* (Hofrättsråd) and *Deputy judges* (Assessorer). Each Court of appeal is subdivided into »divisions», from two to seven in number, in which five Judges have seats, and which exercise judicial powers, provided there be a minimum of four Justices present. All cases, whatever their character or importance may be, can be pursued to the Courts of appeal from lower courts. The Hofrätt is a full court of appeal for both civil and criminal cases, where consequently the actual facts of the case in question are again thoroughly sifted, and fresh evidence may be adduced. The cases are brought forward, in some instances, by constituent members of the tribunal, in others by special officials attached to it.

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The highest judicial tribunal in olden times was the King. His functions as such are now exercised by the **High Court of Justice** (Högsta Domstolen), with a membership of 18 professional lawyers, entitled *Chief justices* (Justitieråd). As a rule, seven members at most are engaged in the hearing of any one case. In order to ensure uniformity in the administration of justice, it is enacted, however, that when the decision of the majority as delivered in any division is found to be at variance with some legal principle previously established by the High Court, the case shall be referred to the further consideration of the members of the High Court met in full conclave. Any case tried in the Courts of appeal may be carried forward to the High Court if it be desired to challenge the judgment passed. The High Court is a court of appeal in the fullest sense. The cases are prepared and brought before the High Court by a special Office: *Revising Judicial Office* (Nedre Justitierevisionen), the members of which have the title of Revising Commissioners (revisionssekreterare).

Differences in many important respects exist in the treatment of **civil** and **criminal cases.** As regards both, however, the procedure in the lower courts, is one of »oral transaction and protocol», that is to say, the record of proceedings taken at the oral examination of witnesses etc. forms the basis of the decision arrived at. In the superior courts, on the other hand, proceedings are almost wholly conducted by means of written documents, although, in many cases, the parties can be heard orally. It is not obligatory to employ *counsel*, and no system of pleading in the courts has been organized. In consequence, it is necessary for the presiding judge in the inferior courts to be very alert in his conduct of the proceedings. The sessions of the lower courts are open to the public: records of the proceedings at all the courts (including the records of voting), and also all the documents and briefs drawn up in connection with the cases are accessible to any and every one for examination or publication if he so desires.

There are *certain suits*, more especially those relating to the liberty of the press, to bills of exchange, and to maritime affairs, in which the Town-court has the sole right of decision. For mercantile suits there are no special courts. Of **special tribunals** still existing may be mentioned the Court of Impeachment (see page 178); and the Audit Court (Kammarrätten), for dealing with cases arising out of the maladministration of public funds. There exist, furthermore, certain Ecclesiastical Courts, for trying clergymen accused of offences in the discharge of their office, Military Tribunals, and Landed Property Courts, for settling certain questions regarding the adjustment of estates etc.; the constituent members of the last named courts are the District-judge together with assistants chosen by the community from among persons of competent knowledge on the questions at issue; the members of these courts are empowered with individual and equal voting rights. Any one sentenced in any of these special courts — the Court of Impeachment of course excepted — has the right of appeal to the general courts, or at all events to the High Court of Justice.

The *military tribunals* of the first instance — the Military courts (Krigsrätter) — are constituted by four military men and one professional lawyer. The tribunal of the second instance is a special Military Court of appeal (Krigshofrätten), constituted in a similar manner. Appeal may be lodged from that tribunal to the High Court, where two military men also have seats when military cases

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are being tried. With respect to the publicity of procedure and of the records of the proceedings, the same regulations hold good as for the corresponding general courts of justice.

As a general rule it may be stated that there are no special courts constituted for dealing with **disputes in administrative affairs.** Such are dealt with by the body or authority immediately concerned, against whose decision appeal may be made in the final resort to the Government. In cases respecting the administration of the poor law, the Audit Court is that of final resort.

Executive authority is not exercised by the courts of justice, but by special bodies, chiefly administrative in character. Claims for the recovery of a debt, of which the creditor has evidence in writing, are to be preferred either in the inferior courts of justice or before superior executive bodies. The decisions arrived at in the latter case may be appealed against in the Court of appeal, while a debtor who has been sentenced to pay a claim which he repudiates, may bring the matter before the notice of an inferior court of justice.

Sweden has accepted the articles of the **Hague Convention** respecting international legal assistance, as it is termed. A special convention had, long before, been entered into with Denmark, whereby the execution of sentences was assured for the two countries commutatively.

Of the three *Courts of appeal*, the Svea Hofrätt embraces within its jurisdiction Svealand, Norrland, and the island of Gotland; the Hofrätt for Skåne and Blekinge, those two provinces; and the Göta Hofrätt, the remaining provinces in Götaland. The areas and populations of the country under the jurisdiction of each of the three were in 1900:

	Läns.	Sq.-kilom.	Population.
Svea Hofrätt	14	349,209	2,492,989
Göta »	8	75,255	1,868,680
Skåne »	3	14,289	774,772

To obtain the total area of Sweden, 9,109 sq.-km. must be added on for the four large lakes in Central Sweden.

Some of the more important items in the Swedish **Judicial Statistics** for past decades may be here given, by way of conclusion to this survey. (The criminal statistics have already appeared in this work). The annual number of *cases of dispute* brought before the courts of the first instance is as follows (for the sake of comparison the figures of the population are appended):

Periods.	Mean population.	No. of Cases Annually.	Per 1,000 inhab.
1831/40	3,013,722	80,440	26·69
1841/50	3,306,269	70,835	21·42
1851/60	3,642,321	54,593	14·99
1861/70	4,079,233	43,710	10·72
1871/80	4,386,953	31,780	7·24
1881/90	4,673,225	39,700	8·50
1891/95	4,831,814	40,361	8·35
1896/00	5,032,074	40,842	8·12

The astonishing diminution in these figures is, doubtless, to be ascribed to a constantly extending educational improvement among the masses; for that, contrary to the expectation of many, appears unmistakably to have lessened the attractiveness of going to law. It is, however, possible that the courts of justice are less resorted to, on account of the slowness of all procedure in them. Of

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the total number of civil cases raised, some 40 % are decided by compromise or are allowed to lapse.

Out of every thousand of the *civil* actions brought before the lower tribunals, 110 (on an average for the five years 1891/95) were carried forward to the Courts of appeal, while in 21 cases proceedings were continued to the High Court of Justice, whereas in one thousand *criminal cases* only 32 were carried forward to the Court of appeal and not more than 9 to the High Court. A fluctuation in the proportion of appeal cases may be seen during the period 1860/75; the number was on the increase, only to diminish again subsequently.

In regard to the decisions of the lower courts appealed against during the period 1891/95, 63·4 % of the judgments in the civil, and 76·3 % of those in the criminal cases were *confirmed* by the Courts of appeal. The High Court, again, confirmed 81·1 % of the judgments in civil, and 86·9 % of those in criminal cases where an appeal was made to it from the decision of the Court of appeal. Following out the results of the cases of appeal from the lower courts on to the High Court, we find, for the years 1887/91, that 57·5 % of the decisions in the district-courts, and 64·7 % of the decisions of the town-courts were confirmed by the Supreme Court. With respect to all the figures above given, it may not be out of place to call the reader's attention to the fact that the *reversal* in the decisions is often only a partial one, and that it is not infrequently solely due to the fresh evidence which is adduced at the re-trial. It is not the rule, especially in the lower courts, for expert counsel to appear. That circumstance is often responsible for the investigation of a case being far from complete, whereby is necessitated a further evidence in a superior court.

The Prison System.

The Swedish prison system is unquestionably of a high order. In its present form it is the result of half a century's persistent and thorough work of reformation.

The initiative to these reforms was taken by the Crown Prince, afterwards King Oscar I, by his well-known work: *On Punishments and Prisons*, published in 1840. In this work he advocates the Philadelphian system (the cell system) as the best basis for the treatment of prisoners in general. The old or Auburn-system ought to be retained only for hopeless cases of relapse and for prisoners »sentenced to a longer term of imprisonment than experience has shown can be spent in separation without injury to the prisoner». This system should, however, be given up »in the same degree that experience shows a more extended application of the separate system to be beneficent». The work of building prisons according to the cell system was immediately undertaken, and most of the »läns» of the kingdom had prisons of this kind when the penal law of 1857 was promulgated. Through this law the cell system was made obligatory for all sentenced to penal servitude for a term of two years or less.

The experience gained since then has brought a conviction that the cell system might advantageously be extended, and through the law of July 29, 1892 the maximum time of confinement is extended to three years. The law provides that each prisoner sentenced to penal servitude for four years or less shall during the time of punishment be kept in cellular confinement, when one fourth of the time

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of sentence is deducted. Those sentenced to penal servitude for a term exceeding four years or for life shall be kept in cellular confinement the first three years of their servitude, when one-third of the time spent in separation is deducted from the time of sentence in the cases where a definite term exceeding four years has been fixed.

When the law of 1892 was promulgated, a sufficient number of cells had already been provided to meet the increased demand. After the rebuilding and extension of several prisons and the erection of a new »Län» prison in Stockholm have been finished, there are at present three **central prisons** intended for men sentenced to a term exceeding two years, viz. at *Långholmen* near Stockholm with 200 day- and 300 night-cells, in *Malmö* with 137 day- and 284 night-cells, and at *Nya Varfvet* near Gothenburg with 210 day-cells (forty separate workshops included) and 116 night-cells. There is, besides, one central prison for women in *Gothenburg* with 6 day- and 60 night-cells, intended for prisoners who already (in certain »län» prisons) have been kept in cells during three years. The total number of cells at the central prisons are thus 1,313, of which 760 are night-cells. — Sentences of two years and less are worked off in 24 **Län prisons** and 20 **State jails** with a total number of 2,439 day-cells.

At the close of the year 1900 there were in the prisons above mentioned 2,450 prisoners, of whom 1,623 were *sentenced to penal servitude*. Of the latter, 146 were sentenced for life, 615 to penal servitude for more than two years, and 862 to two years or less. Of the two first-mentioned categories, 24 and 486 respectively were kept in solitary confinement in accordance with the law of 1892. — Of the three categories respectively, 43, 76, and 85, or together 04 were women.

Of the rest, or 827 prisoners, 275 were awaiting trial, 257 were sentenced to simple imprisonment, 273 sentenced to imprisonment in default of payment of fines, and 22 lodged in jail for vagrancy or mendicity. The number of women were respectively 21, 12, 12, and 5, or altogether 50.

For those sentenced for vagrancy or mendicity or those sentenced to compulsory work by the poor-law, there are four **central workhouses,** viz. at *Svartsjö* (337 night-cells) for men who have not before been sentenced to penal servitude; and in *Karlskrona* (300 night-cells) for able-bodied men, who before have been sentenced to penal servitude. For women, who before have been centenced to penal seritude or are from the city of Stockholm, there is a compulsory workhouse in *Norrköping* with 156 night-cells. Women belonging to other places than Stockholm and sentenced for vagrancy and who have not before been held to penal servitude, are sent to *Landskrona* (108 night-cells). The whole number of night-cells in the central workhouses were 901. In 1900, the whole number of prisoners held to penal servitude was 810; of these 213 were women.

The total number of **prisoners** of different categories kept in prisons and penal workhouses were on an average for the year 1900: 2,988, or 5·84 on each ten thousand of the population. During earlier periods the corresponding numbers were:

In	Mean population.	Aver. number of prisoners.	Per 10,000 inhab.
1861/70	4,079,000	5,392	13·22
1871/80	4,387,000	4,681	10 67
1881/90	4,673,000	3,954	8·46
1891/95	4,832,000	3,290	6·81
1896/00	5,032,000	2,991	5·94
In 1900	5,117,000	2,988	5·84

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The great decrease in the number of prisoners depends, no doubt, to a certain extent, on a decrease of criminal acts, witnessed by the figures quoted (page 151). To a great extent, however, it depends on a more humane legislation. It is now especially customary to pardon prisoners sentenced for life if they have shown good behaviour for a long time. In 1855 there were in the penitentiaries of Sweden 1,520 prisoners for life to only 146 in 1900.

The average number of *new prisoners*, sentenced to penal servitude, received each year in 1896/1900 was 1,852, of which number 220 were women. About 32·2 per cent of them, or 604 of the whole number, had previously undergone sentences to penal servitude. The yearly number sentenced to irredeemable imprisonment during the same period was 1,098, and the number sentenced to prison in default of payment of fines was 16,074. Of the last-mentioned two groups there were respectively 69 and 1,008 women.

Finally, in this connection may be stated the number of *executions* in earlier and later times. Of each million inhabitants 14·91 executions were made yearly during the period 1749/73, but already 1774/95 the average number had decreased to 4·06. The corresponding figure for the years 1891/1900 is only 0·08, as during these ten years only four persons have been executed.

All penitentiaries and penal workhouses are governed by the *Royal Board of Prisons*. This Board consists of one General Director and two Bureau chiefs, of which the one represents matters of administration, the other those of finance. The different penitentiaries are managed by *governors* (some smaller jails by chief warders). At each penitentiary there are also a preacher and a medical officer. At the central prisons are besides appointed a storekeeper, an accountant, and deputy governors. The warders are chosen with scrupulous discrimination, and, by raising their pay from time to time, it has been made possible to raise the standard of education and moral fitness. A warder receives now, when he has been ten years in the service, 1,050 kronor besides rooms and fuel. (A Swedish krona corresponds to 1·10 shilling or 0·268 dollar).

With regard to the *treatment of prisoners*, it has already been stated that it is based on the cell system. Only the relatively few prisoners sentenced to penal servitude for a term exceeding four years and those sentenced for life, work, after three years of cellular confinement, together in large workshops, but are kept apart while not working, and spend the nights in sleeping cells. The compulsory workhouses, where the prisoners are always together at work, have all night-cells, and it has been proposed that a system of separation should also here, at least among the younger prisoners, be inaugurated with the hope of better educational results.

In the application of the cell system the aim has always been as far as possible to prevent results of isolation injurious the prisoners, and to make the penalty undergone by the prisoners serve for their own reformation. Various means are employed for this purpose, such as systematic and regular work; daily exercise in the air (in special airing yards for at least half an hour; directions (pasted in each cell) for rational physical exercise; well chosen libraries

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(fully 50,000 vols. together); instruction in religion and school-subjects and by visits in the cells by the prison officials as well as by other voluntary visitors. Strict obedience to rules and regulations is required, and all means for self-indulgence, as for instance tobacco and snuff, are totally forbidden for those sentenced to penal servitude, those held to compulsory labour, and those sentenced to prison in default of payment of fines. Prisoners on trial and those sentenced to simple imprisonment may procure better diet and more comfort than can commonly be had in the prison, if they have the means and desire to do so, and if the order and security of the prison thereby is not endangered.

The very important question of **prison labour gratuities,** and measures necessary to prevent prisoners from squandering the money so gained on their release, have, as far as the central prisons are concerned, been satisfactorily solved by the regulation concerning prisoners' gratuities of Oct. 24, 1890. The accumulated wages are deposited in the Post-Office Savings Bank and can, if they exceed 20 kronor, be taken out only at a certain monthly rate. If the released prisoner during this time is arrested for vagrancy or crime, he has no right of disposal over the money and, if he is convicted and sentenced for crime or to compulsory labour, he loses them. It is clear that this regulation to a certain extent tends to counteract relapse into crime. The sum total deposited in the Post-Office Savings Bank, for prisoners released in 1900, amounted at the time of their release to 24,127 kronor. The amount forfeited the same year through relapse was 1,336 kronor.

In order that prisoners may to some extent be able to aid those who by their fault have become needy, and in order to make it possible for them to keep and resume family ties, they are allowed to send part of their gratuities to their nearest relations. The prison board may also augment these remittances from a fund, *David Carnegie's fund*, donated for the purpose. During the year 1900, 423 prisoners sent to their relations a sum total of 3,179 kronor, to which the prison authorities added 1,471 kronor from the said fund.

There is a Central Society for the Aid of Released Prisoners, the Queen's Home, and 23 societies in the different Läns, all active in the aid and amendment of **released prisoners.** From these societies, as also through prison boards or private persons and communities, in all 1,034 prisoners received support, in 1900, in the form of employment or work procured, clothing, tools, travelling expenses, and so forth.

The total average *expenditures* per annum for the prisons of the kingdom (maintenance of buildings, but not erections of new prisons included) have averaged 1,766,044 kronor during the period 1891/95, and 1,733,840 kronor during the years 1896/1900. The cost of daily rations for each prisoner was during the same periods 28·50 and 30·80 öre respectively. In 1900, the total amount of costs was 1,801,992 kronor and the cost of the daily rations 33·05 öre, namely 30·01 öre at the central prisons and penal workhouses, and 35·59 at the Län prisons and State jails. (A krona à 100 öre = 1·10 shilling or 0·268 dollar)

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Hygiene and Care of the sick.

There is no mention of doctors in the History of Sweden before the 16th century. They were educated at medical schools abroad, and employed partly in the service of the Court and wealthy nobility, partly in that of the army. They constituted no union, and were independent of any medical authority. It was not till long afterwards that traces appear of a regulated medical service. Some doctors practising in Stockholm obtained by humble petition the right of establishing a *collegium medicorum*, which was endowed with certain privileges in 1663, during the regency of Charles XI; and out of this originally private clique of physicians gradually developed the legal authority that has to superintend the hygiene and medical treatment of the kingdom.

The control of the entire medical administration of Sweden, together with the Civil and Military establishments pertaining thereto, is vested in the *Royal Medical Department*. This is composed of a President, termed Director General, and five Medical Councilors. Among these, one is Surgeon General and one a Veterinary Surgeon for controlling matters affecting that special branch of administration. These officials are appointed by the King.

Everyone who has taken the degree of Licentiate in Medicine has a right to practise as a **physician.** The Swedish University Medical Course is a long one, averaging about 11 years, and, generally speaking, a man seldom completes his studies before he is thirty. Since 1870, the right of practising medicine has been granted to women also. Students receive the requisite training at the two Universities of Uppsala and Lund, as well as at the Caroline Institute of Stockholm.

TABLE 37. *Staff and Institutions for medical relief.*

At the end of	Total of					Per 100,000 inhabitants.			
	Physicians.	Midwives.	Infirmaries*.	Sick-beds*.	Chemists' shops.	Physicians.	Midwives.	Sick-beds.	Chemists' shops.
1860	445	1,525	48	2,904	159	11·5	39·5	75	4·12
1865	505	1,717	57	3,493	187	12·3	41·7	85	4·55
1870	560	1,864	77	4,466	200	13·4	44·7	107	4·80
1875	549	2,151	93	4,793	227	12·5	49·1	109	5·18
1880	555	2,264	108	5,967	234	12·2	49·8	131	5·12
1885	624	2,377	122	6,485	245	13·3	50·8	138	5·23
1890	806	2,478	127	7,111	259	16·8	51·8	149	5·41
1895	1,002	2,626	137	7,821	297	20·4	53·4	159	6·04
1900	1,131	2,782	145	9,114	323	22·0	54·2	177	6·29

* Military hospitals, lying-in hospitals, children's hospitals, and lunatic asylums not included.

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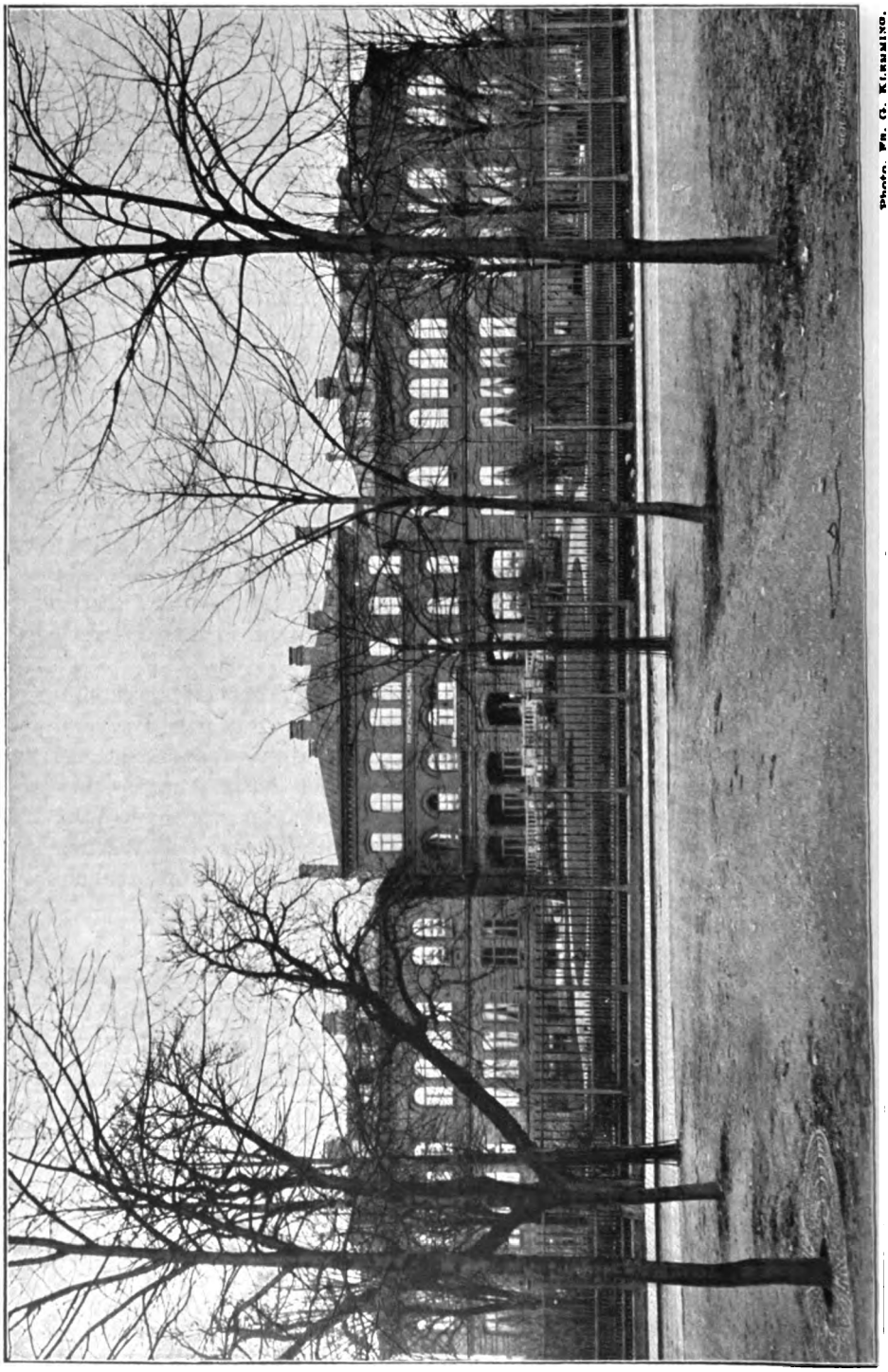

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The number of doctors at different periods since 1860 appears in Table 37. At the end of 1901, there were in Sweden 1,336 *Licentiates in Medicine*, amongst whom seventeen ladies. If from these figures a deduction is made of the number of doctors who are prevented from practising, either on account of their official position, their age, or for some other reason, there remain somewhat more than 1,150 who may be considered directly occupied with the medical treatment of civilians and soldiers.

With the exception of about 350, who have exclusively devoted themselves to private practice, the number of doctors *appointed* to attend to the needs of the community at large is: 317 for country places, 147 for towns, 161 for infirmaries, 38 for Lunatic Asylums and Homes for the Mentally Afflicted, 51 for the prisons, 92 for the State Railways, etc. Two or more appointments can be held by the same medical man.

In 1902, 139 of the doctors appointed for the country were *Provincial Physicians* — together with that of the official doctors of the towns, this is the oldest medical institution in Sweden paid exclusively by the State; of the other country doctors 154 are called *Extra Provincial Physicians*, and are paid by the State and local district in common, by the local district alone, or else by private people. Among the Provincial Physicians of each Län (the town of Stockholm excepted) there is one who bears the title of *First Provincial Physician*, and acts as inspector, not only over the hygiene and care of the sick in the district of the Provincial Physician in the immediate neighbourhood of his County town, but also over the Civil Medical service — especially Public Health — in the entire Län. For their assistance there are state-appointed *Assistant Provincial Physicians* — one for every First Provincial Physician. — For medical service in the Army and Navy, there are 266 Military surgeons and 10 hospitals.

TABLE 38. *Infirmary returns for 1861/1900.* [1]

Average for the years	Mean population.	Annual number of			Per 1,000 inh.		Days of maintenance per individual admitted.	Dead out of 1,000 admitted.	
		Sick people admitted.	Days of maintenance.	Dead.	Admitted.	Days of maintenance.		In all.	Venereals excepted.[2]
1861/65...	3,993,000	23,043	841,960	1,526	5·77	211	36·5	66·2	80·7
1866/70...	4,166,000	28,342	1,103,040	1,876	6·80	265	38·9	66·2	81·5
1871/75...	4,274,000	30,551	1,162,520	2,403	7·15	272	38·1	78·7	88·6
1876/80...	4,500,000	33,399	1,280,631	2,233	7·42	285	38·3	66·9	75·1
1881/85...	4,605,000	42,245	1,525,260	2,643	9·17	331	36·1	62·6	70·6
1886/90...	4,742,000	49,592	1,648,574	3,069	10·46	348	33·2	61·9	67·1
1891/95...	4,832,000	60,400	1,910,454	3,673	12·50	395	31·6	60·8	65·2
1896/00...	5,032,000	75,989	2,366,594	4,234	15·10	470	31·1	55·7	59·4
In 1900...	5,117,000	77,996	2,504,577	4,479	15·24	489	32·1	57·4	60·4

[1] Military hospitals included but not lying-in hospitals, children's hospitals, and lunatic asylums. — [2] Among venereally diseased, the annual mortality for the eight quinquennial periods was 10·0, 8·7, 13·0, 8·4, 6·3, 4·9, 4·4, and 4·0 ‰ respectively. The total of patients suffering from venereal diseases and admitted at the infirmaries amounted during the same periods annually to 118, 144, 94, 92, 115, 88, 91, and 99 per one hundred thousand inh. respectively.

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TABLE 39. *Hospitals and asylums for lunatics.*

At the end of	Places at hospitals and asylums.	Ditto per 100,000 inh.	Average for the years	Lunatics attended to. [1]	Days of maintenance.	Lunatics admitted.	Cured.	Dead.	Expenses. Kronor. [2]
1860	1,008	26	1861/65....	1,064	388,406	309	125	79	327,485
1865.....	1,241	30	1866/70....	1,211	441,933	330	138	77	400,545
1870.....	1,322	32	1871/75....	1,382	504,482	376	146	80	514,789
1875.....	1,513	35	1876/80....	1,603	585,050	423	135	93	682,786
1880.....	1,991	44	1881/85....	2,026	739,538	657	219	114	921,253
1885.....	2,257	48	1886/90....	2,416	882,016	741	258	125	1,020,850
1890.....	2,625	55	1891/95....	3,285	1,199,110	1,035	255	163	1,421,911
1895.....	4,259	87	1896/00....	4,240	1,548,164	955	270	197	1,819,976
1900.....	5,070	99	In 1900...	4,458	1,627,025	1,252	235	212	2,129,605

According to the latest statistics, there are for medical attendance to the community at large 145 **hospitals,** 73 of which are Län- and Lock Hospitals (the latter being a division for venereal diseases) and 72 other establishments for the sick, containing altogether 9,114 beds, being one bed for every 564 inhabitants. For the increase in the number of beds since 1860, as well as for details concerning the extension of care for the sick, see Tables 37 and 38. — One hospital, situated in the parish of Järfsö in the län of Gefleborg, is exclusively set apart for lepers, of whom, however, only about 60 exist in Sweden.

With regard to the *expenses* attendant on the care of the sick (the lunatics not included), we are informed that these at Län- and Lock hospitals alone (apart from the construction of buildings and their keeping in due repair), taking a yearly average for periods of five years 1861/95, respectively amounted to 0·43, 0·63, 0·84, 1·09, 1·31, 1·45, and 1·81 million kronor; for the year 1899, the sum reached a total of 2·45 millions. The *entire* expenses, which were defrayed by the parishes and County Councils, for hygiene and care of the sick (including buildings) during the quinquennial periods 1876/95, respectively amounted to 2·94, 3·16, 4·17, and 5·27 million kronor, and, for 1899, reached a total of 7·71 millions, (towards which the parishes contributed 4·68 and the County Councils 3·03 millions). To these must be added the outlays by the Treasury, which in 1899 amounted to 1·15 millions. (A krona = 1·10 shilling = 0·268 dollar).

The **treatment of lunatics** in its *modern* form may be said to have commenced in Sweden in 1830, after which time the previously existing, scattered asylums by and by became subject to a uniform organization. It was not, however, until 1877 that the lunatic asylums were placed under the supervision of the Medical department. Since 1899, there is a chief inspector specially appointed to superintend the treatment of lunatics in the Kingdom.

The statute now in force regarding lunatics, is of 1901; by that, a sharper control over public as well as private asylums of the kind in question has been brought about. On the whole, much has been done during the last decades towards amplifying and reforming the treatment of lunatics; for new buildings alone, a sum total of 4 million kronor has been granted by the Riksdag during the last ten years. As shown by Table 39, the number of sickbeds at the public

[1] The number of days of maintenance divided by 365. — [2] Buildings besides.

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hospitals and asylums for lunatics has, between 1860 and 1900, increased from 1,008 to 5,070, which figure, after the now approaching completion of one more asylum, will rise to above 6,000. In spite of this, the supply is, however, still insufficient, and it is considered that perhaps 10 million kronor more will have to be invested in new establishments before *each* lunatic in the kingdom, in need of hospital care, can receive the benefit of being properly attended to — a desideratum certainly not reached as yet in any one country, though.

Sofia Hospital, Stockholm. Photo. GUSTAF LINDQUIST, Stockholm.

All the larger lunatic asylums (treated of in Table 39) are at present State establishments. Concerning the principles of treatment followed, it may be mentioned that, in all suitable cases, the patients are kept in bed under permanent superintendence, whereby coercive means have been rendered almost unnecessary. More liberal forms of treatment for chronic lunatics have hitherto but seldom been applied; a change in this respect is, however, quite proximate. — As a general judgment, it may be maintained that, even if the Swedish system for the relief of lunatics cannot yet be said to stand on a level with those of England or Germany, still it will hardly be found to fall behind that of any other country; and, at present, earnest exertions are made in Sweden by and by to bring our treatment of lunatics on to the standard of the most exacting claims of the times.

The whole number of *lunatics* (not reckoning idiots), in the census of 1890, amounted to 8,703 or 182 per hundred thousand inhabitants. The number has increased, according to official returns, but this *may* — at any rate partly — be owing to more exact information. Even the latest returns may, however, probably be incomplete — as the case, no doubt, is in other countries in this respect. The percentage of lunatics in Sweden cannot be considered high when compared with that of other nations.

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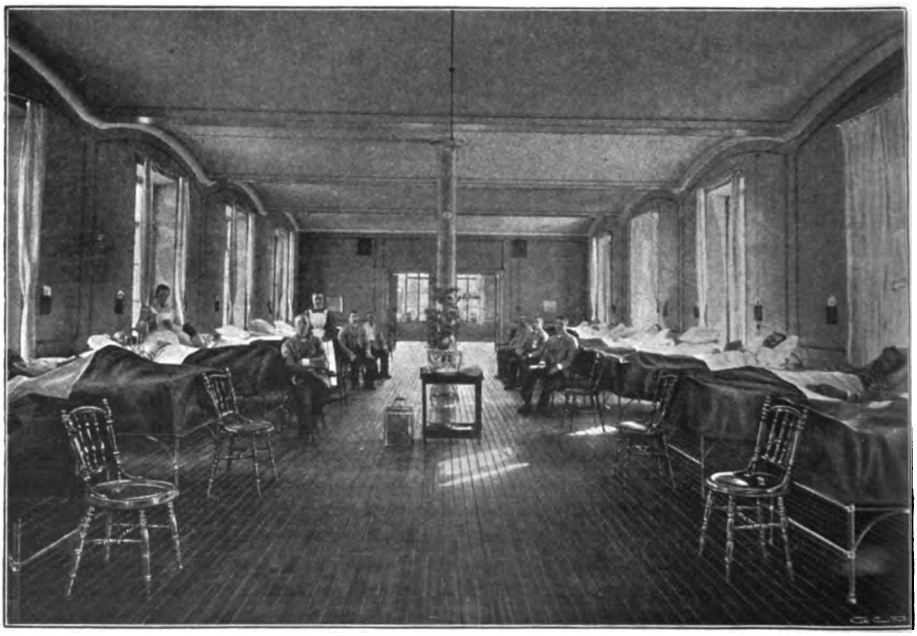
In the beginning of 1902, there were 319 **dentists,** 19 of whom were ladies. The right to practise dentistry is granted to all who have passed their matriculation and dental examinations. The latter require a time of three years at least. There is an odontological department at the Caroline Institution of Stockholm.

With regard to **midwives,** there are 2,782, corresponding to 32·1 on every ten thousand of the female population in the ages 20/45 years, or 61·3 on ten thousand married women below forty-five. There are establishments at Stockholm, Gothenburg, and Lund for their training. A midwife is obliged to study for at least nine months. At the Stockholm and Gothenburg Institutes, moreover, duly qualified midwives who have shown special knowledge and skill are further instructed in the use of obstetrical instruments. In certain exceptional cases, such a midwife is permitted to use instruments in the exercise of her profession. During 1900, 373 deliveries were effected by midwives by means of instruments.

In the national *Lying-in Hospitals* during the quinquennial periods of 1861/1900, the following number of patients were respectively treated per annum: 1,146, 1,505, 1,465, 1,823, 2,591, 3,381, 3,899 and 5,093; in 1900, the figure reached 5,808. The mortality during the quinquennial periods amounted respectively to 66·1, 48·8, 41·9, 17·8, 6·2, 4·8, 5·0, and 3·8 ‰, which shows an enormous improvement. A great decrease in mortality is also observable in confinements attended to at the patients' homes.



Sick-room of a Hospital in a provincial town. Photo. AUG. WAHLSTRÖM, Falun.

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The medieval profession of **Barber Surgeon** still exists in Sweden, and is now represented by about 100 members distributed in the towns.

After studying for somewhat more than a year and passing an examination, the barber surgeon was allowed to treat wounds, slight boils, and other complaints belonging to the domain of petty surgery, as well as to afford first help in cases of accident, such as hemorrhages, dislocations, and fractures. This institution, which is antiquated and now regarded as superfluous, will, in consequence of a royal decree issued in 1896, cease to exist on the decease of the present holders of that title.

At the end of 1896, there were 768 trained **Sick-Nurses,** 451 of whom were engaged at hospitals, surgical homes, lunatic asylums, and other similar establishments; 255 employed privately in towns (half of these in Stockholm); 26 in district nursing, and 36 in private nursing in the country. With the special object of securing better nursing for the sick in country places, a trained nurse is going to be appointed to each of the Provincial Physicians' districts, which number about 293 in all.

Educated girls of respectable families are received as pupils, and trained in nursing at Sabbatsberg Hospital, Sofia Hospital, the Red Cross Home for trained nurses, and the Institute of Deaconesses at Stockholm, as well as at several provincial hospitals. The period of study ranges from one to three years.

The law enacts that drugs and medicine can only be sold at the **shops of Pharmaceutical Chemists.** The number of such chemists is limited, and a fresh business of that kind cannot be started without the special consent of the Crown. Their establishments are subjected to the inspection of officials appointed for that purpose, and also to the annual visitation of the First Provincial Physicians. According to the latest official reports, there are 323 Chemists' shops in Sweden; (cf. Table 37). For the technical instruction of chemists, which, like that of medical men, is very thorough, there is a *Pharmaceutical Institute* in Stockholm. The period of study after matriculation extends over at least 7 years, the preparatory practice during an apprentice-ship at a pharmacy included.

No country shows a *lower death-rate* or a higher average of human life than Sweden. The reason of this must be sought, not only in such circumstances as the isolated position of the country, its climate, the enlightenment of its people, their way of life, their distribution over the country, etc., but also in the high standard which **Public Hygiene** has attained in Sweden. The Public Health of the entire kingdom is looked after by the Royal Medical Department; of every Län, by the Governor. It is administered in the towns by a special Board of Health, in the country by the general executive Board of the community — in both cases with the assistance of the several official doctors.

The above mentioned Boards are bound by statute to see that there be within the parish a plentiful and accessible supply of good water for drinking and cooking purposes; that springs, wells, and other places from which water is fetched be not polluted; that risk of pollution in or near dwelling houses be avoided; that manufactories and trades be not constructed, disposed, or carried on in a manner likely to prove detrimental to the health of the workmen or the neighbours etc.

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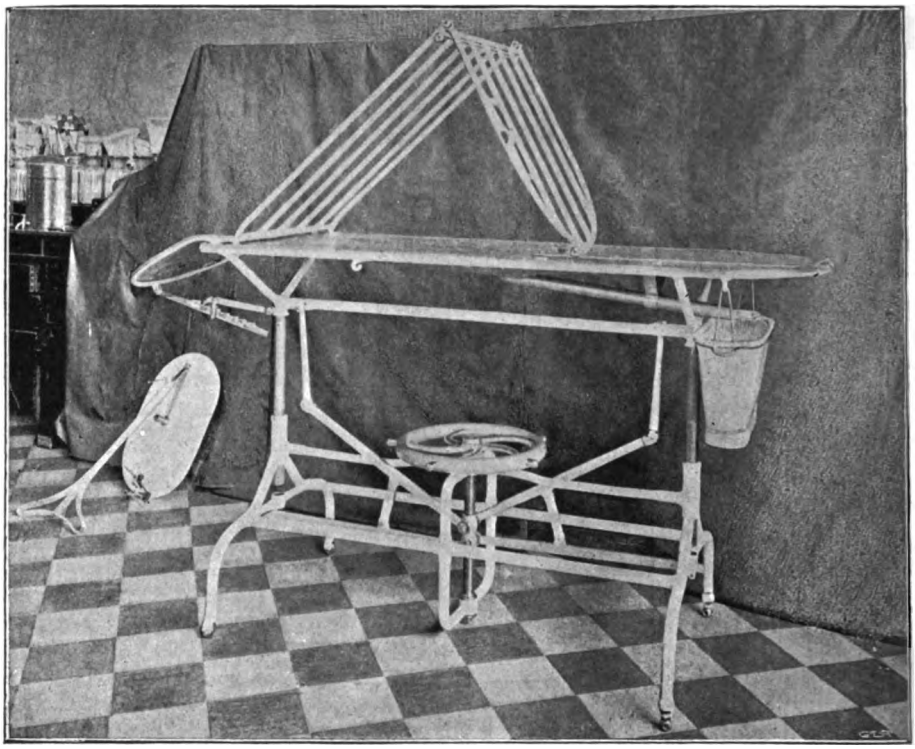
In case of *epidemics* or contagious diseases, the Board can call upon the official physician to visit the spot and order proper measures, or the Board reports on the outbreak of a contagious disease to the Governor, who issues orders to the official physician. In times of epidemic, the Board has a right to forbid large gatherings of the populace, such as at fairs and so on, and to inhibit, for long or short periods, attendance at school etc.

Every doctor is bound to inform the authorities of any cases of the following infectious diseases occurring in his practice, viz. cholera, small-pox, typhus, typhoid, scarlet-fever, diphtheria, dysentry, leprosy.



Operation Table, invention of Mr. A. Stille, Stockholm. Photo. GUSTAF LINDQUIST, Stockholm.

Every parish is bound to have a sick-ward or some such place for isolating infectious patients. New *hospitals for epidemics* have been built in most towns, and such are also to be found in country districts, but less frequently. Every person suffering from any of the above mentioned infectious diseases is bound by law to submit to be treated at an epidemic hospital.

If a case of epidemic be treated in the patient's home, the latter must allow certain measures of disinfection to be taken to prevent the spread of the disease. At hospitals, which have disinfecting ovens, all means of disinfection deemed necessary are taken. There are *water-works* with good water in all the larger towns, and also in a great number of the smaller ones. The water-supply is taken from lakes, rivers, or wells. In the larger towns, there is a thorough *system of drainage.* Both in the towns and in the country, the greatest cleanliness prevails, the maintenance of which is subjected to proper inspection.

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To prevent the importation of *contagious diseases*, such as plague or cholera, *from abroad*, certain rules are laid down. Ten days' detention in *quarantine* is ordered for ships arriving from plague-stricken places; and two days' for vessels coming from places where the cholera is raging, during a time when there appears to be any risk of importing these diseases; to which purpose, in such cases, the Board of Trade issues special proclamations. A vessel stricken with plague or cholera is disinfected and cleansed at certain establishments. Sweden possesses two such, situated on its remotest archipelagoes, viz. Fejan on the E. and Känsö on the W. coast. Persons on board who are suffering from plague or cholera are isolated, and nursed at the establishment on shore. Persons coming from districts where the cholera is raging are subjected to inspection for three days from the time of landing. No rags, clothing, or bedding that have been used must be brought from plague-stricken places, and a number of other articles, such as furs, skins, hides, cotton, flax, hemp etc., only after having undergone disinfection.

Every child is required by law to be **vaccinated** before attaining the age of two years. No one is admitted to any public school unless he has been vaccinated or had the small-pox. Not only doctors, but also sextons, midwives, and certain other persons of both sexes provided with certificates of requisite knowledge in the art of inoculation, are allowed to vaccinate. Revaccination is not obligatory, except in the case of army recruits. Of the revaccinations performed in the army in 1898, 72 % proved effectual. There are plenty of vaccinators, one or more in every parish. Vaccination is looked after by the Board of Health, Parish Vestries, official physicians, the clergy etc. In order to provide good *vaccine*, there are, besides the chief depot at Stockholm, 12 vaccine depots in different parts of the country — all under the superintendence of official doctors. There is a penalty attached to neglecting vaccination. Zealous vaccinators are encouraged by pecuniary rewards, gifts of vaccination instruments, and medals. The practice of vaccination has attained such development and stability in Sweden as to serve for a model to other countries. Sweden is universally acknowledged to be »the best vaccinated country in the world». The abundant material supplied on this subject by the statistics of Swedish population — about the result of which the diagram on page 246 gives an idea — has also proved of great importance for learned discussion on the value of vaccination.

During the warm months of the year, Sweden, with her easily accessible lakes, rivers, brooks, and bays, affords abundant opportunities for **bathing.** Excellent sea-bathing is obtainable on her coasts. The most popular sea-side places on the W. coast are Varberg, Lysekil, Strömstad, and Marstrand; on the Baltic, Visby, Borgholm etc. Complete *Hydropathic establishments* are to be found at Söderköping, Mösseberg, Hjo, Bie etc. In the larger towns, there are also *Warm Baths* open to the public. They are generally in the hands of companies or private people. All the usual kinds of baths are to be met with. The supply of water for every bath is pretty large, on an average from 6 to 7 hundred liters, but often 1,000. *Swedish hot-air* and *mud baths* are peculiar to our country. The former, which are something between the Roman-Turkish, dry hot-air bath

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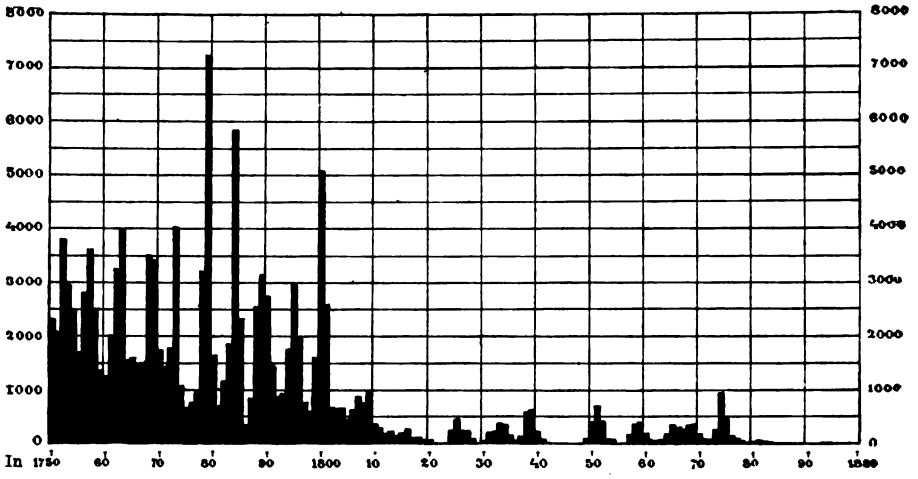
*Number of deaths from small-pox per 1 million inhabitants, 1750/1899.**



and the Russo-Finnish steam-bath, consists in sweating, followed by washing in a large room of moderate warmth and moisture, the whole concluding with refrigeration in a plunging bath. The bath, termed »badstubad» (or simply »badstu») is a cheap and highly relished bath for the lower classes and the schools. The mud-bath, which is peculiarly Swedish, derives its origin from Loka Brunn in the län of Örebro, and has been in use for more than 200 years. The difference between this and similar baths abroad is that the mud is rubbed into the skin, and the muscles are afterwards kneaded. The mud, through its large percentage of silicate particles, produces with friction a powerful stimulus.

Sweden is abundantly provided with **watering-** and **seaside-places,** their number, not counting the above-mentioned, amounting to more than 50. There are many mineral springs. As a rule, they are chalybeate, and contain iron in the form of carbonates or sulphates, the only exceptions being the Torpa and Sophia Springs at Helsingborg and the Linné Spring at Gothenburg, which contain iodides and bromides. The most popular mineral springs are Ronneby, Medevi, Ramlösa, Lundsbrunn, Sätra, and Porla. In 1897, the number of persons staying at the various watering-places in Sweden, not counting casual visitors, were reckoned at 21,000, of whom about 13,000 were women and 8,000 men. About 15,000 of such visitors used the local or other mineral waters, 7,000 underwent a complete water-treatment, 5,600 a course of medical gymnastics and massage, etc. The following complaints are most frequently treated at watering-places, viz. muscular rheumatism, nervous diseases, anæmia and chlorosis, affections of the stomach, bowels, heart, and vessels, and diseases of the joints and bones.

During the quinquennial periods of 1861/1900, the number of *patients* treated at health resorts and seaside places amounted respectively, on a yearly average, to 12,639, 11,849, 18,396, 13,460, 14,465, 17,695, 20,211, and 22,712, which figures seem also to be influenced by the condition of the prosperity of the country.

* For the years 1750/73 the original figures include both small-pox and measles; though a subtraction is made in the above diagram of one third for elimination of cases of measles. This proportion is considered the probable average; it has naturally, however, been varying from year to year, to which here no attention could be paid.

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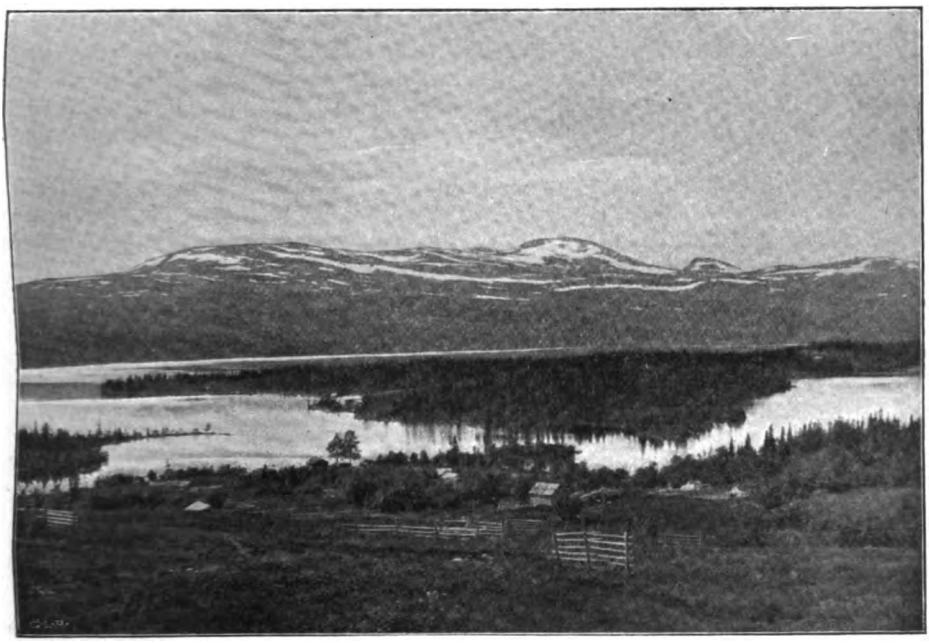
The fight against the **Tuberculosis** has of late years become one of the most important questions of the day, and has given rise to vigorous measures in Sweden, comparatively more, perhaps, than in most other countries. Tuberculosis, especially in its commonest form: consumption, appears, in Sweden, less in the Län of Jönköping than in other parts of the country, and most in the Län of Norrbotten, where it is three times as frequent as in the former district. The disease has increased considerably during the last decades, especially in Norrland. This increase has generally been confined to country places, where it has manifested itself especially by an increased mortality within the younger ages of the unmarried female population. Concerning the towns, a considerable decrease could, for several decades, be stated, especially in Stockholm and other larger cities, but also here, the condition has been fluctuating of late years.



Environs of Kolåsen Fresh-Air Sanatorium, Jemtland.

The measures recently taken to exterminate this disease have been very extensive, the chief of which is the erection of three **Sanatoria for the people,** Hålahult (in Nerike), Österåsen (in Ångermanland), and Hessleby (in Småland). The funds for these amounted to a total of 3,500,000 kronor (about 200,000 £), the greatest part of which were supplied by the King's generosity in assigning for this purpose the sum collected in 1897 for his 25 years' Jubilee. The balance (850,000 kronor) has been voted by the Riksdag.

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At the sanatoriums there are during the whole year 320 places available in all, namely 24 in private rooms at the price of 3·50 kronor per day, 72 in semi-private rooms at the price of 2·50 kronor, and 224 places in the general rooms, out of which 131 at the price of 1·25 kr. and 93 at the price of 0·50 kr. (A krona = 1·10 shill.). Besides, there are at the two southern sanatoriums together, summerplaces to the number of 8 in semi-private rooms and 32 in general rooms. In case of urgent demand, some few more places can be provided. The stay at a sanatorium not being intended for a length of time exceeding three months, about 1,300 people can thus annually be taken care of at these establishments.

With regard to the management of the sanatoria, their chief administration has been vested in at least 60, at most 80 *Directors*, selected by the King from different parts of Sweden; five persons are selected to form the *Chief Board* for administering the Jubilee Fund and the Sanatoria. The Chief Board appoints the Chief Physician and other officials. The narrower administration of every sanatorium is carried on by a *Board* consisting of a chairman, elected by the King for a period of four years, the Chief Physician, and 2 members chosen by the Chief Board for a period of four years.

In 1897, the Town Council of *Stockholm* granted 200,000 kronor for defraying the expenses of nursing at sanatoria certain destitute persons belonging to the Stockholm community and suffering from consumption. In the same year, 82,500 kronor were assigned for a pavilion at Sabbatsberg Hospital to facilitate the isolation of consumptive patients under treatment there. Besides, a pavilion for consumptives has been erected at St. George's Hospital in the capital.

At Mörsil in Jemtland there is a *private sanatorium*, which has recently been enlarged. In addition to these, several smaller sanatoria and places for air cure have been founded, especially set apart for the treatment of consumption during the summer months. In a great many parishes, special prophylactic precautions have been taken to prevent the spread of this disease.

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3. MUNICIPAL ADMINISTRATION.

Independent municipal government is carried on in Sweden, partly by the *Läns* and partly by the *Communities;* in both cases, especially with regard to the latter, there is that marked distinction between town and country which is such a characteristic feature in Swedish administration. Here we shall first treat of the Communities.

In former times there were municipal authorities also for the *hundreds* (härad) and the *villages*. At the present day, only a few insignificant remnants of these exist for the hundreds, mainly in matters relating to roads (vid. the section dealing with Highways below).

Self-Government of the Communities.

In Sweden, for many centuries, the self-government of the communities was closely connected with that of the church parishes, and even at the present. day the areas of the communities are, as a rule, identical with those of the church parishes, except that the larger towns are divided into several parishes.

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However, by the statutes of 1862 now in force, ecclesiastical and lay matters are strictly separated. Here we have only to concern ourselves with lay communities, for under the heading of »The Church» there will be found an account of church parishes.

Independent municipal administration in Sweden is of hoar antiquity. The freemen themselves in the oldest times managed the business of the village, hundred, and province at their meetings (ting); but when the various provinces were fused into a kingdom, a large part of this popular administration passed into the hands of State officials, or of church rectors and noble patrons in the country. *Vestries* as authoritative and *Church councils* as executive authorities have, however, existed since the time of the Reformation, although what had been customary from time immemorial was more fully established by royal decree in 1817. In 1843, a *Parochial Board* (sockennämnd) was established for transacting matters not concerning Common Schools or the Church. On *March 21, 1862*, were passed the decrees now in force regarding both lay and church self-government, divided into four distinct laws; on May 23 that same year a particular law was made with regard to the city of Stockholm.

A) Every town and, as a rule, every country parish constitutes a **Community** (Kommun). In 1899, the total number of such communities amounted to 2,496, of which 92 were town and 2,404 were country ones. The communities, on an average, comprise about 2,000 inhabitants (in the country about 1,700, in towns close upon 12,000), and the country communities, on an average, comprise an area of 190 square kilometers (in the six most northerly Läns about 1,000, in the rest only 75; a sq. kilom. = 0·386 sq. mile).

For the town-like places risen in recent years in many parts of the country, adjacent to manufactories, railway-stations etc., a special statute has been passed, which in certain cases bestows on them a municipal administration of their own, whilst in other respects they still belong to the community in which they are situated. The total number of such places amounts to about 120.

B) **The Suffrage** is rather widely extended, inasmuch as everyone (both men and women) possesses it who owns real estate (however insignificant it may be) or who rents real estate or, finally, who pays direct tax to the State (the »General Supply», see page 208). This last applies to everyone who possesses an income of at least 500 kronor (in certain communities where living is more expensive, who possesses an annual income of 600 to 650 kronor)*. Moreover, they are required not to be in arrears for unpaid rates. The suffrage is also enjoyed by bodies corporate e. g. companies etc.

The total number of persons entitled to vote is given in 1892 as 704,610 (the figure is somewhat too high) or, if bodies corporate be excluded, to 688,836, which corresponds to about 25 per cent of the population over the age of twenty-one years. Amongst men the proportion amounted to about 50 per cent; among women the proportion was about 3 per cent (about 44,000 altogether), which figure will have

* A krona (plur. kronor) = 1·10 shilling = 0·268 dollar.

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TABLE 40. *Revenues of the communities during 1876/95 and in 1899.*[1]

Average for the years	Mean population.	Amount of revenue. Kronor (à 1·10 shilling).				Per inhabit.
		Taxes.	State grants.[2]	Other revenues.	Total.	Kronor.
1876/80	4,500,000	23,558,000	2,716,000	16,484,000	42,758,000	9·50
1881/85	4,605,000	26,952,000	3,318,000	20,658,000	50,928,000	11·06
1886/90	4,742,000	29,356,000	4,114,000	25,321,000	58,791,000	12·40
1891/95	4,852,000	34,161,000	4,753,000	28,272,000	67,186,000	13·90
In 1899	5,080,000	40,884,000	6,060,000	39,716,000	86,660,000	17·06

considerably increased since then. In 1900 the total number (men, women, and bodies corporate) amounted to 829,487, hence a very great increase since 1892[3].

The democratic decrees now spoken of as affecting the municipal suffrage get quite a different character through the way in which count is made of the number of *votes*. In fact, every person possessed of the right to vote has a number of votes proportionate to the amount he pays in *taxes* — with certain restrictions. In the *country communities* every member has one vote for each tenth of a krona, paid in »General Supply»; however, no more than five thousand votes and no more than a tenth of the total unreduced number of votes in the community; in the *towns:* one vote for each entire krona of the same tax, though no more than a hundred votes and no more than a fiftieth of the total number.

This »*graduated suffrage*» undoubtedly gives a peculiarly plutocratic stamp to Swedish municipal administration, but, nevertheless, the system on the whole works better than one would be a priori inclined to expect. The innate moderation and regard for the rights of others which is characteristic of the Swedish people, manifests itself in this case also, and many a time citizens possessing an extraordinarily large number of votes voluntarily refrain from exercising the influence which the law has conferred on them. Besides this, the superior influence put into the hands of the wealthier and more educated classes often counteracts the narrow-mindedness and short-sightedness which very frequently accompany a purely democratic form of government. On the whole, Swedish municipal administration can for competence and integrity bear comparison with that of any other country; but if instances of undue influence are rarer than might be expected, still there will always remain one defect in the system, viz. that it withholds from the masses the valuable education which a greater participation in communal life might afford them.

C) The municipal authorities are partly authoritative and partly executive. With regard to the **authoritative element** there is one very peculiar circumstance, i. e. that, as a rule, this authority is not exercised by any kind of representative, but *immediately by the voters themselves as a body.* Thus it comes about that one may see authoritative municipal meetings consisting of several hundred, possibly even of a thousand persons.

[1] Parishes as well as lay communities. — [2] Principally for the Common schools (in 1899 about 5,544,000 kronor for this purpose). — [3] Both 1900 and 1892 include, however, such as are in arrears for unpaid rates; see above.

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TABLE 41. *Expenditures of the communities.*[1] *Yearly averages.*[6]

Expenditures for	1876/80. Kronor.	1881/85. Kronor.	1886/90. Kronor.	1891/95. Kronor.	In 1899. Kronor.
Clergy	9,029,000	9,644,000	10,014,000	10,634,000	11,350,000
Common schools	8,249,000	9,986,000	11,831,000	14,049,000	19,325,000
Relief of the poor	7,377,000	8,656,000	9,535,000	11,613,000	13,804.000
Medical attendance[2]	1,564,000	1,721,000	2,352,000	2,907,000	4,676,000
Technical schools[3]	604,000	644,000	832,000	867,000	995,000
Public buildings etc.[4]	10,301,000	13,693,000	14,386,000	17,562,000	35,750,000
Other purposes[5]	8,439,000	10,481,000	12,024,000	13,869,000	16,566,000
Total	**45,563,000**	**54,825,000**	**60,974,000**	**71,501,000**	**102,466,000**

This ultra-democratic system (a direct descendant of the primitive Germanic Folk-meetings) prevails in country communities almost universally. On the other hand, in towns it is only allowed in the smallest, i. e. those with a population of less than 3,000. Even these small towns may, moreover, elect a representative, if they wish, and this is obligatory in the case of the larger ones. — The deliberative and authoritative **Communal Assembly** is called, in the country, Kommunalstämma, in towns, Allmän rådstuga.

In the country communities, the Communal Assembly elects its own president and vicepresident for four years, but in the towns the mayor is *ipso facto* president. Ordinary assemblies are held in the country communities three times a year, viz. in March, October, and December. Extraordinary meetings are, however, held (usually at least five in the course of the year) for transacting special business. In the towns, the assembly ordinarily meets only twice a year, viz. in June and December.

Communal Assemblies settle general communal business, elect the executive officers, and possess the right of levying communal taxes. The general tax of the Community is assessed according to what each person pays to the State in the tax called General Supply, which is a direct tax (in some measure a progressive tax) on property and income (cf. page 208).

A bare majority is, with few exceptions, required for carrying a resolution at the Communal Assemblies. The resolution may be *appealed against* by any member of the Community, whether he has a vote or not, if he is of opinion that such a resolution infringes on his private rights or is contrary to law. His plaint is brought before the Governor, from whom a further appeal can be lodged with the Government of the State.

In certain cases, the express sanction of the Governor is required, in others, even that of the State Government. The most important of the first-mentioned cases is the imposition of rates extending beyond a period of five years. The consent of the Government is required for contracting a loan not redeemable within two years, and also in certain other instances.

[1] Parishes as well as lay communities. — [2] Including Hygiene. — [3] Communal grants to State Colleges inclusive. — [4] Streets and public places, communications etc.; see Table 42. — [5] See Table 42. — [6] A krona = 1·10 shilling = 0·268 dollar.

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TABLE 42. *Specification (for the towns) of the Expenses headed »Public buildings etc.» and »Other purposes» in Table 41.* In Kronor.[1]

	Average 1876/80.	Average 1881/85.	Average 1886/90.	Average 1891/95.	In 1899.
A) *»Public buildings etc.»*					
Houses[2]	1,342,000	2,578,000	2,549,000	3,835,000	11,289,000
Streets, markets, and squares	2,356,000	4,418,000	3,765,000	3,278,000	3,975,000
Harbours and bridges	2,274,000	2,199,000	1,765,000	2,313,000	3,866,000
Scavenging	334,000	462,000	557,000	848,000	1,451,000
Street-lighting	537,000	601,000	756,000	895,000	986,000
Waterworks	579,000	819,000	1,062,000	1,166,000	2,693,000
Fire-organization	610,000	505,000	564,000	702,000	1,071,000
Total for the towns	8,032,000	11,582,000	11,018,000	13,037,000	25,331,000
Country communities	2,269,000	2,111,000	3,368,000	4,525.000	10,419,000
Total	10,301,000	13,693,000	14,386,000	17,562,000	35,750,000
B) *»Other purposes.»*					
Administration[3]	1,034,000	1,073,000	1,113,000	1,128,000	1,213,000
Police	1,256,000	1,439,000	1,738,000	2,190,000	2,573,000
Interest on loans	2,994,000	4,100,000	4,934,000	5,767,000	6,533,000
Total for the towns	5,284,000	6,612,000	7,785,000	9,085,000	10,319,000
Country communities	3,155.000	3,869,000	4,239,000	4,784,000	6,247,000
Total	8,439,000	10,481,000	12,024,000	13,869,000	16,566,000

As we have already mentioned, in towns the right of decision is exercised in municipal matters by a *representative*. In the smallest towns this right is optional. These representatives are called **Town Councils** (Stadsfullmäktige) and are elected by ratepayers according to the graduated suffrage-scale (vid. page 250). The *number* of Councilors is dependent on the population; the highest number allowed is 60, except at Stockholm, which has 100. Councilors are elected for four years (at Stockholm only for two), half the number of whom have to be elected every other year (in Stockholm every year).

D) **The executive authorities** in the communities are quite different in the Country and in the Towns. In the **country,** every community has, as a rule, a single executive authority, viz. the *Vestry Board* (Kommunalnämnden), which is composed of at least 3, at most 11 members elected for four years, and half the number is changed every other year. The members of the Vestry Board do not receive any remuneration for their work. The rector of the parish is also entitled to attend at Vestry Board meetings. In some communities, a special Board of Guardians is elected. — In **towns,** the communal executive authorities are, to a certain extent, mixed with those of the State. The municipal authority is confided to the *Magistrates*, who, however, at the same time compose a Court of First Instance. The Magistrates

[1] A krona = 1·10 shilling = 0·268 dollar. — [2] Expenses for churches, schools, charitable institutions, and infirmaries not included. These are entered under their own respective headings in Table 41. — [3] Jurisdiction included.

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consist of the *Mayor* and Aldermen, of whose appointment mention has already been made in a preceding section (page 195). In every town there is also elected a *Board of Finance*, which manages the property of the town.

The towns, moreover, appoint a number of *special boards* for certain purposes, as the care of the Poor, Public Hygiene, Building, Fire service etc., all of which fall under the control of the Magistrates. For towns, there are also special *Police regulations* issued for the maintenance of public safety, which it is the duty of the *Police authorities* to apply.

E) Certain details with regard to the **finances** of communities are given in Tables 40—42. These same also include the sums dispensed by the ecclesiastical authorities of the parishes.

The total **assets** of the Communities amounted in 1899 to 376·90 million kronor, 278·74 millions of which consisted of real property. The **debts** made up 226·21 million kronor. As already mentioned, the *general tax* of the communities is assessed according to the State-tax called General Supply, and in proportion to the latter; the total tax of the communities, during the quinquenniums 1876/95, amounted to respectively 7·40, 7·46, 7·55 and 7·60 times as much. The earlier returns not being quite complete, there has been practically no increase.

The great **forest funds** which certain parishes in Dalarne and Norrland (or, more properly speaking, the landowners within these parishes) have acquired of recent years by the sale of the public forests, are not included in the communal assets. These funds are sometimes very important (in the communities of Orsa and Elfdalen 10 and 6 millions respectively) and they will, however, in future rise in value, inasmuch as the ownership of the woods has not been sold, but only the right of working them for a certain number of years. In such communities, rates of all sorts are met out of these properties (even for such members who own no land), and all public institutions of modern times (schools, roads, bridges, railways, telephones, modern lighting, etc.) are provided and equipped in a rather costly style — a most singular sight in parts which not long ago were considered among the most out-of-the-way and poverty-stricken in all Sweden.

Poor Relief.

In Sweden the Public Relief of the Poor is almost exclusively in the hands of the communities, and should therefore be treated of here in connection with Communal Administration. — The line between Public Poor Relief, i. e. that decreed by law, and Private Benevolence has of late years become rather more sharply defined. Still, however, there are several points at which their accounts are mingled.

In former times, the care of the poor devolved in the first place on their relations, and according to the most ancient laws, those who turned their parents out of doors were punished. Those who became poor through no fault of their own went round to their neighbours and asked for alms. In the Middle Ages, the Church took the poor under her protection, and sometimes surrendered two-ninths of the tithes to the farmer, on condition that he undertook to assist beggars. Hospices were erected for the sick and indigent poor near churches and monasteries, and

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TABLE 43. *Relief of the poor during 1876/95 and in 1899.*

Average for the years	Mean population.	Persons enjoying parochial relief.			Per 1,000 inh.	Expenditure. Kronor. [2]	
		Direct.	Indirect. [1]	Total.		In all.	Per inh.
1876/80	4,500,000	150,894	52,726	**203,620**	45·2	7,377,000	1·64
1881/85	4,605,000	162,418	61,280	**223,698**	48·6	8,656,000	1·88
1886/90	4,742,000	172,233	64,706	**236,939**	50·0	9,535,000	2·01
1891/95	4,832,000	181,813	71,847	**253,660**	52·5	11,613,000	2·40
In 1899.....	5,080,000	174,351	62,035	**236,386**	46·5	13,804,000	2·72

these were, later on, converted into hospitals and workhouses. At the Reformation the tithes were confiscated by the State, and the obligation to look after the Poor gradually devolved on the communities. Begging in public was allowed in Sweden up to the passing of the first Public Poor Relief Bill on May 25, 1847.

A) **Public Poor Relief.** According to the present Poor Law Relief Bill, passed on the 9th of June 1871 (with a few alterations afterwards), every community constitutes a body for the relief of the poor. The request for poor relief is to be made by the community in which the petitioner is living; but the costs of such relief have to be defrayed by the community where the petitioner is *domiciled*. Such needful relief *must* be afforded to minors and others who through old age, sickness, infirmity, or bodily defects are incapable of earning a living or are devoid of means of their own, and have none to take care of them. Support *may* be granted in other cases after due investigation by the Poor Law Board. Every able-bodied person is bound to maintain himself and such children of his as are under age; every able-bodied person must support his wife. Parents and children must support one another in proportion to their needs and capabilities. Menial servants and other labourers, their wives, and children under age, must be maintained by their masters during the period of service for which they are engaged.

In the country communities, the general executive authority (Kommunalnämnden) constitutes the *Board of Guardians* where no special such Board is established, which is seldom the case. In towns, a Board of Guardians consisting of at least five persons is elected, as a rule, for four years. The rector of the parish is *ipso facto* member of the Board (in towns as well as in the country); women can be elected members of special Boards (since 1889), but not of the Kommunalnämnd.

A Swedish citizen acquires *domicile* (vide supra) in the community where he has last been assessed for taxes. After the age of 60, a person retains ever afterwards the domicile he had when reaching that age. A wife has the same domicile as her husband. Legitimate children under age have their father's domicile, but, in the case of his death, their mother's. Illegitimate children under age have their mother's. If a person who migrates to a community has for himself, his wife, or children, the year previous or subsequent, been in receipt of poor-relief from the

[1] Children of parents enjoying parochial relief. — [2] A krona (plur. kronor) = 1·10 shilling = 0·268 dollar.

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place he removed from, or stands in need of such relief during the first calendar year after such migration, he is regarded as having his domicile in the place from which he has migrated. No one can be refused the right of changing his abode on the ground that he may possibly come to need parish relief. — *Appeals* against the refusal of parish relief can be brought before the Communal Assembly and after that before the Governor.

Begging is forbidden by law. If the beggar arrested is in necessitous circumstances, he obtains assistance; if otherwise, he is warned and, in bad cases, can be sentenced to compulsory work. Minors (under 15 years of age) who have repeatedly been guilty of begging, are chastised by order of the police authorities in their parents' or guardians' homes.

The Poor Law Guardians are bound on receipt of application for relief to inquire carefully into the petitioner's position and needs, and into how far such relief should be afforded; to see that necessitous children not only receive maintenance, but also a fixed abode and Christian education; to take note that such support is properly applied, and with that object to divide the community into districts, each under the inspection of a special Guardian.

Poor Law Guardians have *the right of guardians and masters* over those who are entirely dependent on them for maintenance, and all that they possess devolves on the community. The Poor Law Guardians have *the right of masters* over a) everyone who is in receipt of other relief than full maintenance; b) those whose wives, or children under age, are entirely dependent on them for maintenance; c) those who through idleness bring their wives or children to such poverty that the latter are in need of assistance, even if that assistance be only a temporary one.

If those falling under the dominion of the guardian are capable of work, but refuse to perform the tasks assigned to them, or otherwise conduct themselves contumaciously or licentiously, then such are to be warned, and if the warning is unheeded, they are to be brought before the Governor, who has the power to condemn them to enforced labour. In the case of those under age, the Board can order them a thrashing. — The community has the right to be *compensated* for relief afforded out of such property as the recipient of such relief possesses or may come to possess, and out of the earnings accruing to the latter for work performed while in the dominion of the guardians. In the case of the recipient of relief having a kinsman properly answerable for his maintenance, the latter shall pay this. If this be not done voluntarily, then the matter is to be brought before the Governor.

Communities make their own *regulations*. The most common is that children (less frequently elderly persons) who get direct poor relief *are boarded out*, but elderly persons with none to care for them, widows, and unmarried women with children are taken care of in *Poor-Houses* or similar establishments, while the rest receive quarterly or monthly allowances in *money* or kind whilst they live in their own cottages or are boarded out. There are *Workhouses* in the larger towns. In the country, **Poor-farms** have of late years been more and more

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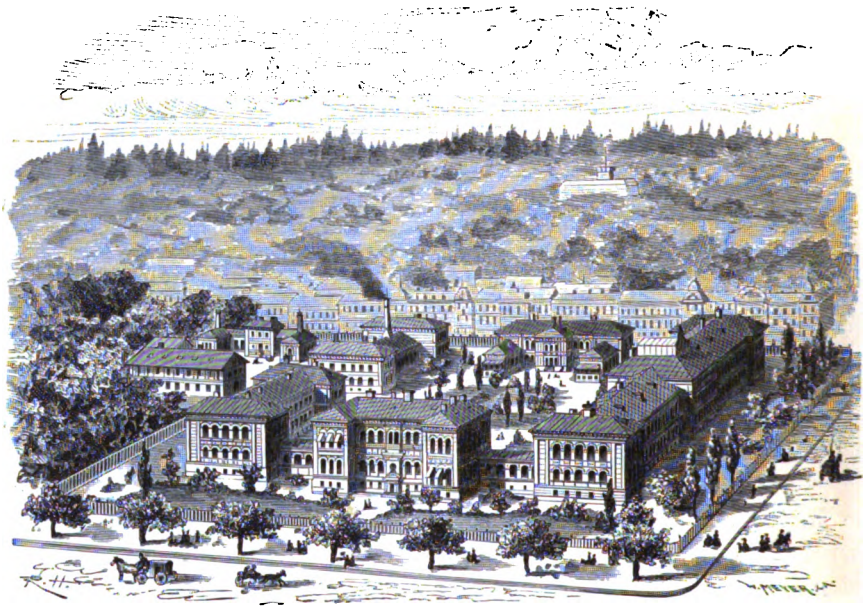
frequently established, and there the necessitous get lodging, food, clothing, as well as mental and physical attention on condition of working at the Master's orders, according to their capacity, at farming, the management of domestic animals, and simple handicrafts. These establishments, when intelligently managed, have proved fitting Homes, and, to a large extent, pecuniarily profitable to the community. In 1899, the whole number of Poor-farms amounted to 282, accommodating 16,180 paupers.



Public Orphanage, Stockholm.

Among **special localities** in Sweden, the towns of Gothenburg and Gefle are, in point of parochial poor relief, deserving of special notice. *Gothenburg*, which so often has taken the lead concerning institutions for the general welfare, is of note also because, already in 1799, an organization was effected there which is very nearly identical with the system originating much later at Elberfeld and deriving its name from that town. In Gothenburg, however, by reason of several difficulties, this organization had to be abolished again in 1834. In *Gefle*, the Elberfeld system has in our days been put into practice and is there embraced with great interest, which has spread also to some other places in Sweden.

A public institution, though to a great extent founded on private donations, is the **Public Orphanage** of Stockholm. It is placed under the authority of a Board, consisting of the High Governor of Stockholm, the Chief of the police, and six members appointed by the King. The newly erected building of this orphanage is the most modern and practical of its kind, and one of the largest to be found anywhere. From sanitary and economical reasons, the children are, as soon as ever convenient, for care and education left in charge to persons bearing a good character and living out of the orphanage, preferably to country people.

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TAB. 44. *Paupers fully provided for, in 1885. By age and civil conditions.*

Age.	Population, end of 1885.	Paupers fully provided for.	Per cent of population.	Fully provided for per 100 *men* within each group.			Fully provided for per 100 *women* within each group.		
				Married.	Widowers.	Single.	Married.	Widows.	Single.
0 15 years..	1,538,438	15,620	1·02	—	—	1·06	—	—	0·97
15 25 » ..	822,485	2,410	0·29	0·03	—	0·34	0·01	1·21	0·28
25 35 » ..	644,661	1,942	0·30	0·02	0·27	0·57	0·02	2·18	0·64
35 45 » ..	524,202	3,146	0·60	0·07	0·57	2·50	0·09	3·36	2·10
45 55 » ..	456,312	4,395	0·96	0·23	1·32	5·42	0·14	2·92	3·43
55 65 » ..	388,864	6,439	1·66	0·54	2·38	9·32	0·34	2·76	5·99
65 75 » ..	224,058	10,016	4·47	1·89	5·30	14·40	1·33	5·76	13·20
75 ω » ..	83,749	11,248	13·43	6·70	13·70	27·50	5·50	14·50	29·50
Total	4,682,769	55,216	1·18	.	.	.	.	.	.

The Statistics relating to the Relief of the Poor in Sweden go back to 1805; in their present developed form, however, only from 1874. In 1899, there were 5,253 establishments of different sorts for relieving the poor, which are capable of containing 63,365 persons in all. The total number of persons in receipt of parish relief since 1876 is shown by Table 43, which also exhibits the total expenses of such relief. In both cases the data received at the beginning were less ample, hence, the increase in the table is partly apparent. An augmentation, however, did actually take place in the extension of Poor Relief in the period 1881/90, chiefly in consequence of the very great increase in the number of persons in more advanced age, of which mention has been already made. Of late years the number of paupers has again diminished, in consequence of the improved economic conditions in general and, perhaps, also through the »Poor-farms» (see above).

In 1894, 6·36 per cent of the population under the age of 15 were enjoying relief, 2·26 per cent of unmarried men, 4·50 per cent of unmarried women, 2·91 per cent of married men, 3·02 per cent of married women, 13·51 per cent of widowers and no less than 23·11, or nearly a fourth, of widows. These figures comprise the total number of persons in receipt of parish relief, even those who only obtain minor and occasional assistance. With regard to the *fully provided for*, a special enquête was made in 1885, certain results of which are reported in Table 44. According to this enquête, at least 4·79 per cent of illegitimate children have to be maintained (besides such as receive minor assistance), but of legitimate only 0·64 per cent. Fixity of residence, even of the humblest kind, always shows as a necessary consequence a decreased need for poor relief. It must be observed that the figures in Table 44 are undoubtedly a trifle too low. In 1899, the total number of those wholly supported by the parish amounted to 73,994. Those boarded-out were 31,947 (three-fourths of whom were children), those in hospitals 7,218, and those supported in their own homes 150,517.

B) **Private Charity** is very extensive in Sweden and has at command, also, considerable donations; in the year 1895, about 77 million kronor. A certain part of these funds, however, is administered by communal authorities, in which case the money distributed will, at least in part, be reckoned in the figures given above in the matter of public poor relief.

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Private charity in Sweden has little in common with the almsgiving e. g. in the South of Europe. Still, in Sweden also there is, naturally, more or less distribution of relief without any very exact knowledge whether there is need of it or as to how it will be used. Great efforts have been made during the last few years to give a wiser direction to charitable endeavours; and this is especially the object of the Charity Organization Society in Stockholm founded on an English model.

The Charity Organization Society (Föreningen för Välgörenhetens Ordnande), commonly called F. V. O., has for its mission to work in the capital towards a well regulated collaboration, irrespectively of differences of religious or political opinions, between benevolent private persons, institutions, or associations, and the poor relief boards, and, consequently, while striving to check and discourage mendicancy, to concentrate and regulate all our available strength so as to permanently ameliorate, in accordance with a united systematic action, the condition of those who are in need of help. All who feel interested in and who are willing to take part in such a work have a meeting-place at the Central Office of the Association, where persons in need of help also apply. The members of the Association, moreover, send thither all applicants for relief unknown to them, that information may be obtained about them.

The Central Office has at its service persons of both sexes, who visit the homes of the applicants and inquire into their circumstances. Through constant intercourse with the poor themselves and their landlords, employers, etc. these »visitors» are in every separate case able to give the quickest possible information in regard to their true condition. The visitors present a report on every case, containing all the information they have been able to obtain, so that the Office may be in a condition to form a conception of what can and ought to be done. Each individual case with reports are brought before a working committee chosen from amongst representatives of the Parish Board of Guardians, various charitable societies, and other persons who work amongst the poor; and the application is summed up in a document (»case-paper»), and the committee decides what steps shall be taken or recommended.

The Central Office is not specifically intended to be an administrator of relief, but only to arrange matters and to obtain the collaboration of all those who in each special case can do their share; but the public uses it as an intermediary also in supplying relief. From a lending fund are issued small loans to needy persons when this is found advisable. Implements of work, such as sewing machines and similar articles, are also given out as a loan. A »sloyd» department provides work for women and men who, from various causes, cannot obtain it otherwise. In a home for children, infants from poor families receive care and attention for a time, when, for one reason or another, such cannot be suitably supplied by their mothers.

The association endeavours, by means of pamphlets, meetings, and lectures, to propagate information relating to whatever can favour rational work for the poor.

The F. V. O. was organized in 1889. The number of members is now about 2,200. At the Central Office, which was opened in 1890, 12 persons are daily assiduously occupied; only one of these, a bookkeeper, is paid. The registry at the Office now contains 12,000 »case-papers», in which is found information concerning about 50,000 persons. Funds, administered by the Board of Directors for specially stated objects, amount to nearly 450,000 kronor. Through the Central Office, as intermediary, about 450,000 kronor has during these ten years been paid out in relief; and more than 100,000 kronor as wages for work done.

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A special kind of benevolence is that exercised in Stockholm by the **Society for District Nursing for the sick poor in their own homes,** founded in 1888 for the parish of Adolf Fredrik, but now working also in the parish of Johannes, as well as the Kungsholm Sick nursing Society, founded in 1893 upon the model of the above named Society. Both of these societies, by employing paid nurses, engaged for the purpose, greatly lighten and supplement the care devoted to the sick poor by the district doctors of the town. The nurses have not only to give the most careful sick-nursing in the homes of the poor, but have also to aid the sick with food, wine, linen, baths, etc., and to treat outer affections at their (the nurses') own homes. What is thus given is intended only for the restoration to health of the sick person, but no alms may be otherwise given. The expenses of the societies ought really to be covered by the annual subscriptions of the members, and by voluntary contributions in money and kind, but their work has gained such recognition that the civil authorities accord them a grant, and they are also remembered in donations. — Two similar societies have been founded in the year 1899, called the Society for Nursing the sick poor in the parish of Maria and the Society for Nursing the sick poor in the parish of Östermalm.

Among **special localities,** *Gothenburg* also in point of private poor relief ranks highest for the great generosity and circumspection manifested by the citizens of that town in the reformatory social work of our time. The most important institutions for suchlike purposes are dealt with in various places under the heading: Social conditions and Social statistics, at the end of this work. Here, only the information may be imparted that the amount of donations for charitable purposes in Gothenburg have reached the considerable total of about 30 million kronor.

Self-Government of the Läns.

The representative assembly of a Län is called **County Council** (Landsting). A Län can be divided into several County Councils, which has, however, only been done with regard to Kalmar län, which has two such Councils.

Towns which possess more than $^1/_{150}$ of the total population of Sweden are not represented in County Councils, but the correspondent functions are performed in them by the Town Councilors (vide page 252). These towns are Stockholm, Gothenburg, Malmö, and Norrköping, and also Gefle — the latter town by reason of an older decree, when only 25,000 inhabitants were required for exemption from the County Council.

The number of County Councilors varies between 22 and 91, and amounts, on an average, to 48. These are elected separately in the country and towns, in *towns* one for every complete or incomplete total of 2,500 inhabitants; *in the country* one for every complete or incomplete total of 5,000 inhabitants in every hundred (härad). In towns they are elected by the Communal Assembly, where such exists, if not, by the Town Councilors; in the country the election is generally made indirectly, the electors being chosen at Communal Assemblies. To be qualified for a County Councilor, a man must be 25 years old, have his domicile in the Län, and also have the right to vote in the constituency. The election is for two years. County Councilors receive their traveling expenses, but no other remuneration.

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TABLE 45. *Receipts and expenditures of the County councils.*
(A krona = 1·10 shilling or 0·268 dollar.)

Average for the years	Receipts. Kronor.			Expenditures. Kronor.		
	Taxes.	Other.	Total.	Sanitary measures.	Other.	Total.
1876/80	1,123,000	1,108,000	**2,231,000**	1,375,000	784,000	**2,159,000**
1881/85	1,294,000	1,160,000	**2,454,000**	1,442,000	1,174,000	**2,616,000**
1886/90	1,409,000	1,581,000	**2,990,000**	1,819,000	1,172,000	**2,991,000**
1891/95	1,698,000	2,039,000	**3,737,000**	2,358,000	1,476,000	**3,834,000**
In 1899	2,059,000	2,926,000	**4,985,000**	3,030,000	1,680,000	**4,710,000**

These Councils ordinarily meet annually in September at the capital of the Län, but cannot, at most, be assembled for more than seven working-days. The President is appointed by the Government from among the members of the Council. The governor has a right to take part in debates, but not in resolutions. Every member has a vote in the ballot; for certain resolutions $^2/_3$ of the votes are required, in other cases a bare majority. The Government, the Governor, as well as every Councilor has the right of introducing bills. All the most important resolutions, to have validity, must be ratified by the governor. In the case of such ratification being refused, an appeal lies to the Government.

County Councils transact the development of trade, means of communication, hygiene, education etc. *The care of the sick* has become the most important object of their attention, and takes 60 per cent of all their expenses (cf. Table 45). Their principal receipts consist of a share in the fees for sale of spirits (cf. page 282) etc.; where further revenues are necessary, the County Council imposes taxes, i. e. partly a poll-tax for the care of the sick, amounting at most to 50 öre (about $6^1/_2$ d.) for every adult male not especially exempted, and half that sum for every woman, — partly a tax which is assessed according to the »General Supply», corresponding to what is done in communities (vide page 251).

The County Councils have also an important *political* mission in electing members of the Upper House of the Riksdag (cf. page 179).

4. CHURCH AND RELIGION.

At the first glance the Swedes appear to be one of the most homogeneous peoples in the world as regards church and religion; for of the population of Sweden there is hardly one in a thousand who does not belong to the *Protestant* faith, while more than ninety-nine per cent are members of one and the same religious organization, the *Swedish Lutheran Church.* On *closer* investigation, however, it will be found that a great many different phases of religious belief prevail, and indeed it may be maintained that no Christian people of the present time, with the exception of the Anglo-Saxon race, is affected by such a warm religious interest as are the Swedes.

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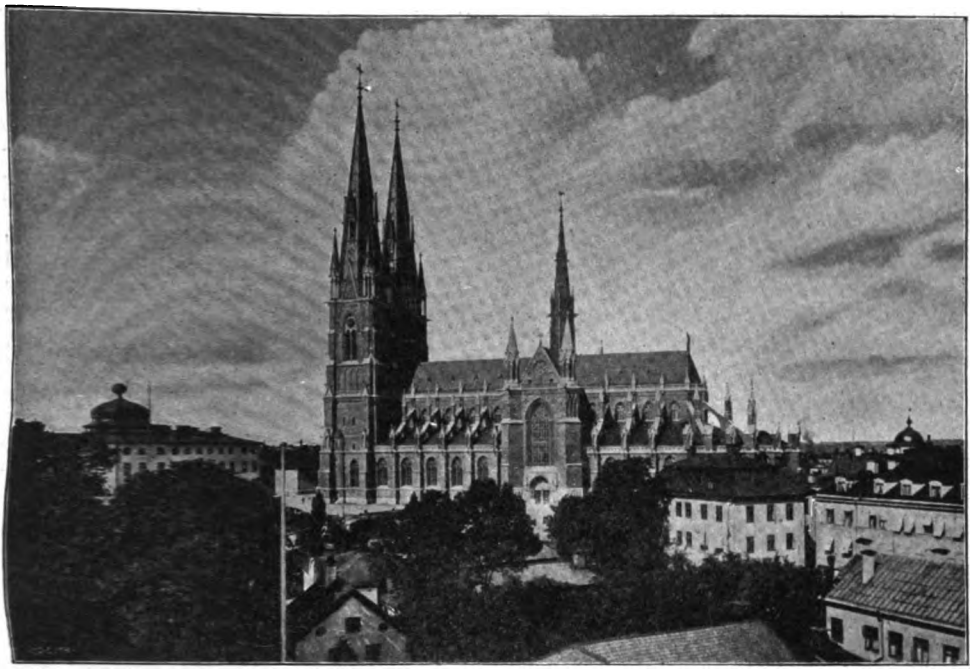

Uppsala Cathedral.

From 830 A. D. — the date when Christianity was preached for the first time in Sweden by *St. Ansgarius* — more than 300 years elapsed before Sweden could be said to be a Christian country, and yet another full century passed before the Swedish Church was completely incorporated in the Roman Catholic Church at the Synod of *Skeninge* in 1248. From 1164 Sweden had been a separate ecclesiastical province, inasmuch as in that year *Stefan*, a monk attached to the earliest Swedish monastery (that of Alvastra, founded 1144) became the first Archbishop of Uppsala. The *Ecclesiastical Privileges*, issued in the year 1200, laid the basis of the political power of the Swedish Church; this power, however, never became so great as in Norway and in Denmark. Yet in regard to its religious influence the Church was stronger in Sweden than in the neighbouring countries. *St. Bridget* (*St. Birgitta*), who died in 1373, is the most notable figure in the Scandinavian religious world during the Middle Ages; though genuinely Swedish she has quite ecumenical views. Moreover, the literature connected with the name of St. Bridget forms the most important intellectual product in the whole of Scandinavia during that epoch, while the Nunnery of Vadstena, founded by St. Bridget, was the parent of as many as 70 similar institutions, some of them to be found as far south as Spain and Italy, and some, again, being still in existence at the present day.

The Reformation reached Sweden as early as 1519, through the instrumentality of *Olaus Petri* (1493/1552), a disciple of Luther and a man of kindred spirit with him; it was not, however, until two generations later that the new doctrine established itself. *Gustavus Vasa* (reigned 1523/60) adopted it, making use of it as the most powerful agent in his scheme of national reorganization. Subsequent to a resolution of the Riksdag of 1527, he transferred the property, political power, and supreme administration of the Church

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into the hands of the King, the Church thereby running the risk of devolving into a mere institution of the State. Thanks, however, to the translation of the Bible into Swedish (the New Testament in 1526, the whole Bible in 1541), the Gospel made its way into the very hearts of the people. The onsets of Catholic reaction under the half-Catholic King Johan III (1569/92) and under the wholly Catholic King Sigismund (1592/99), resulted in Protestantism asserting itself fully under the headship of *Duke Charles* (subsequently King Charles IX), and on the *Uppsala Synod* in 1593, the clergy and people of Sweden united as *one* man to uphold the Augsburg Confession. The Swedish people went out of these contests inspired with a deep and youthful devotion for the Gospel of Christ, a devotion that, in spite of their numerical weakness and their poverty, imbued them with power to vanquish, under *Gustavus II Adolphus*, the mighty federation for Catholic reaction, to save, in Luther's own land, the work of Luther, and to preserve for mankind its most precious possession — an achievement that bears comparison with any other that the history of the world has to show.

Statue of Olaus Petri, Stockholm.

Taking all things into consideration, the first part of the 17th century may fitly be termed the *Period of Greatness of the Swedish Church;* of that fact the names of *Johannes Rudbeckius* and *Laurentius Paulinus* bear witness. Subsequently narrow-minded orthodoxy gained ascendency and the enthusiasm of an earlier age passed away. The age, however, of Charles XI (1660/97) and Charles XII (1697/1718) also produced great divines, such as *Haqvin Spegel* and *Jesper Svedberg* (the latter father of Emanuel Svedenborg). By the Ecclesiastical law of 1686 the Swedish Church obtained the form of organization which in the main is still in existence.

To the *Pietistic* and other dissenting movements, that gradually made their appearance, the Church opposed edicts, legal proceedings, and finally, in 1726, the »*Conventicle Proclamation*», forbidding, on pain of fines, imprisonment, and banishment, other religious assemblies than public divine services and gatherings for private family worship. The Church, having thus effectively discouraged every warmer religious movement and become a formal and secular institution, was powerless to cope with the shallow Neology of the 18th century. During the 19th century this yielded place to, on the one hand, a more living Christianity, evoked by a series of great awakenings and, on the other, to a more pronounced enmity to Christianity. Since the middle of the 19th century, the bands of the State Church have been loosened and ecclesiastical legislation has assumed a more modern guise, without, however, the privileged status of the members of the State Church in certain particulars having been entirely lost.

Though religious liberty is, as we see, only of late origin, the history of Sweden has but few instances to show of serious persecution having taken place. Both in the transformation from Heathendom to Christianity and from Catholicism to Protestantism the religious development of the Swedish nation was a gradual one, no pressure from other nations without being brought to bear, nor from the State authorities above. As a consequence, Christianity has struck deep root in Sweden, an evidence of which is to be seen in the fact that the great national

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and social movements, so characteristic of history in the 19th century, have, with us, been principally of religious origin. Another contributory cause may be seen in the marked trait of mysticism in Swedish national character when sounded to its depths, that in its turn explains the keen religious interest inborn in Swedish minds.

The Constitution of the Church. The Ecclesiastical law of 1686 is still in force, though with essential modifications. The supreme administrator in the Church is the *King*, who has church affairs placed before him by the Minister of Ecclesiastical Affairs and Education. For ecclesiastical legislation is requisite the unanimous decision of King, Riksdag, and Convocation.

Convocation, instituted in 1863 (to replace the Estate of the Clergy in the four-chamber parliament — abolished in 1866), consists of 30 of the clergy (among them the 12 bishops and the Pastor Primarius of Stockholm, as ex officio members) together with 30 laymen representatives, elected indirectly by a very numerous body of electors. Convocation meets once every five years; its last meeting was held in 1898.

For the purposes of ecclesiastical *administration* Sweden is divided into 12 *dioceses*, subdivided into 186 *deaneries*, each precided over by a Dean. The number of *livings* is 1,391, some of which include more than one parish, the total number of *parishes* being 2,556. At the head of every diocese there is a Bishop, supported by a Chapter. A *Bishop* is selected by the King from among the three candidates who, by election of the clergy of the diocese, have received the largest number of votes; he cannot be removed from office unless upon legal enquiry and sentence. The head of the Uppsala diocese has the title of *Archbishop*, and among the bishops he is »primus inter pares». A bishop alone has not the right of final decision; he shares it with the other members of the chapter. Against the decision of a Bishop or a chapter, appeal may be made to the supreme courts of law or to the Crown.

The Chapters, also called Consistories, are composed of the rector of the chief parish in the cathedral city (the Dean), and the majority of the »lectors» (senior masters) at the public college in that city; in the university cities, however, the professors in ordinary of the theological faculty take the place of the said lectors. In the chapter of Gothenburg, besides the dean, two other rectors of the town have also seats. The city of *Stockholm*, really belonging to the diocese of Uppsala, has, notwithstanding, a consistory of its own, composed of the rectors of the city (of whom the one in the Storkyrko-parish is »Pastor Primarius»), besides a so-called Courtconsistory for the court and garrison parishes.

Clergymen in the Swedish Church are educated, after passing the university entrance examination, at the two State universities (Uppsala and Lund), where their courses of study are tolerably long (on an average 5 years), and to a certain extent include other sciences besides theology. Curates (i. e. such clergymen as have not yet received a fixed appointment) are sent out by the chapters to assist in parishes

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where help is needed. Clergymen who have obtained fixed appointments are of two classes: *Rectors* (Kyrkoherdar) — one in each living, and *Perpetual Curates* (Komministrar), constituting a class of assistant clergymen with fixed appointments, especially to be found in such livings as are very large or consist of more than one parish.

Vadstena Church.

With regard to the **appointment** of rectors, the livings are traditionally of three different categories, viz.: *a*) presentative by royal letters (about 500 in number), where the incumbent is appointed by the King, after an election has been made by the parish, to which, in general, regard is paid; *b*) presentative by the Chapter (about 700), where the candidate who at election has obtained the majority of votes is appointed by the Chapter; *c*) donative (between 80 and 90), where the incumbent is instituted by the entitled patron. Of the remaining livings, 33 (a number which is, however, gradually diminishing) are Prebendaryships, while for the others special regulations are in force. The Perpetual Curates are appointed according to the method *b*) above, save in the few cases where they have donative benefices. — There are several peculiar features connected with the *election* of a clergyman in Sweden. Eligible are, in the first place, the three applicants whose names appear on the nomination-list drawn up by the chapter; the applicants must all belong to the diocese. If the parish desires to elect another clergyman, there must be a certain greater majority than usual in favour of it. The right of voting is to a certain extent dependent upon the amount of rates paid, so that one individual may have many votes. In certain cases *women* and artificial persons have votes.

The **payment** of the clergy comes as a rule from their parishes, according to a fixed principle of rateage. The amount varies very considerably. According to a recent digest, 1,368 rectors have an average income of 4,709 kronor (a krona = 1·10 shilling), and 957 perpetual curates have one of 1,743 kronor — in both

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cases with the addition of a dwelling-house. Every eighth rector has an income falling below three thousand kronor, and every eighth perpetual curate has less than twelve hundred kronor. Twenty-three rectors have more than ten thousand kronor each, and thirteen perpetual curates have four thousand kronor or above that. The whole sum of salaries amounted to 8·11 million kronor, of which 1·46 mill. kronor consisted of the revenue from the benefices (=houses with grounds), the whole appraised value of these amounting to 48·10 million kronor. The whole question about the payment of the clergy is now receiving attention and a reform may soon be expected. The salary of a *bishop* is officially reckoned at from 10,000 to 15,000 kronor, and of the archbishop at 16,000 kr.; these amounts are probably, as a rule, far short of the actual sums received. — The Swedish clergy have not the right to **pension** (though their widows and children are entitled to such, from a special fund), hence clergymen who are getting past their work by reason of age obtain assistance from young clergymen not yet holding fixed appointments, whom they usually receive into their own houses and themselves remunerate.

The parish early came to form the basis of secular communal life too. Nowhere, certainly, within the compass of the Lutheran Church has the influence of the parishioners in church affairs been of old greater than in Sweden. In ecclesiastical and educational questions the *Church Assembly* (Kyrkostämman) has the decision; the Rector presides, and every member of the civil community who as such possesses a vote and belongs to the Swedish Church has the right of voting here too, in accordance, however, with a graduated scale, i. e. in proportion to the sum each pays in rates (with the restrictions mentioned on page 250). The Assembly elects two standing committees for four years: the *Vestry Board* (Kyrkorådet) and the *School Board* (Skolrådet), over both of which the Rector presides. The Vestry Board has to look after the concerns of the church, to administer certain church funds, and exercise church discipline. The close connection between church and school in Sweden is a characteristic feature; moreover, the high standard to which popular education has been brought in the country, is largely owing to the efforts of the clergy.

Instrumental in bringing about this result have also been the *Catechetical Meetings* (Husförhör), which have no counterpart in other countries. Already the Ecclesiastical law of 1686 enjoins the clergy to supplement their sermons and interrogations in church on the catechism by visiting their parishioners at home, one after the other, in order to examine them in Christian knowledge. During the 18th century it was enacted their duty so to do, while the obligations of the parishioners with regard to attendance were more precisely defined. At the present time, these catechetical meetings are held for a considerable section of the parishioners together at one time. The institution has, however, in many towns changed so far as to the meetings having assumed a devotional character.

The clergy in Sweden have from olden times kept a number of *Registers* of the population (amongst others those which have formed the basis, for a century and a half, of the famous Swedish population statistics). These registers have been instituted, partly for the requirements of the churches, but also largely for those of national government. The labour of keeping these in large parishes is considerably onerous, and it is carried out without extra remuneration.

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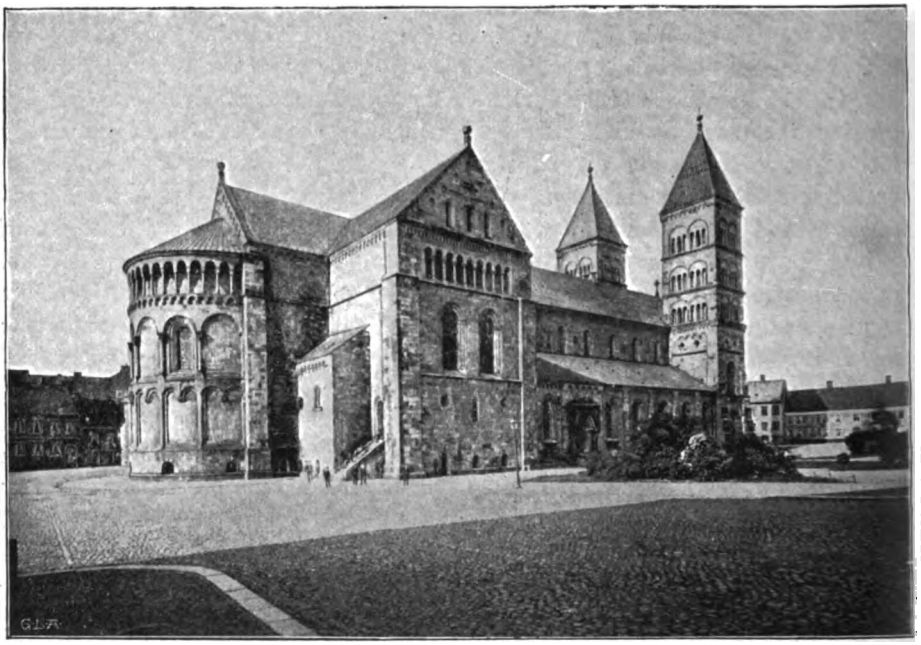
A country *parish* in Sweden has an average area of about 190 square kilometers (in the six northernmost Läns of about 1,000 sq. km., in the rest of only about 75). In North Sweden, parishes are often enormously large; that of Gellivare has an area of 17,000 sq. km., or more than that of the whole of the Kingdom of Saxony. The population in a country parish averages about 1,700, but in a town one, upwards of 9,000. In Stockholm many parishes are exceedingly populous, with as many as 50,000 members and upwards. The total number of *clergymen* in Sweden is about 2,800, or one to 1,800 inhabitants, a proportion which for a Protestant country may be termed normal. In North Sweden, however, the relative number of clergymen is considerably less.

In the quinquennium of 1876/80 the *expenditure* of the parishes in Sweden on the Church and the clergy amounted to 9·03 million kronor a year, and in 1891/95 to 10·63 million kronor, being 2·01 and 2·20 respectively per inhabitant. See further Table 41, p. 251. The value of the churches themselves is estimated at 95 million kronor. (A krona = 1·10 shilling or 0·268 dollar).



Lund Cathedral.

The alteration of greatest moment in ecclesiastical legislation during the 19th century was the practical carrying out of the principles of *religious liberty.*

Since 1741, it is true, *foreigners* adhering to the Reformed Church have enjoyed the right of the free exercise of their religion in Sweden; this right was extended in 1781 to those of other Christian creeds, and in 1782 to Jews also. In spite, however, of the decree of the Constitution that »the King shall not constrain or cause to constrain any man's conscience, but shall protect every one in the free exercise of his religion, provided he do not thereby disturb the public peace nor give offence to the public», the old severe regulations for

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naturalborn Swedes remained on the statute-book, and were occasionally enforced by the authorities; thus they compelled contumacious parents to have their children baptized, and had persons who apostatized from the Lutheran Doctrines and visited conventicles prosecuted and punished. The *repeal of the Conventicle Proclamation*, in 1858, forms the turning-point; since that time the restraints that the parish exercised upon the inhabitants within it, — in so far as they, amongst other duties, formerly always had to employ the clergy of their own respective parishes at baptism, burial, marriage, and communion, etc., — have been relaxed; Swedish citizens have obtained the right to leave the National Church and to form Christian bodies of their own with public divine services and religious instruction according to their own tenets; civil marriages have been introduced for certain cases; and more liberty has been granted with regard to baptism, confirmation, holy communion &c.

Now there is really a very considerable religious freedom prevailing. The most essential *exceptions* to this freedom are: that the King, the ministers of the Crown, and the teachers of religion in government schools must profess, just as the clergy in the Church, the Lutheran doctrine; that monasteries are not to be established; that public religious service of pagan description is forbidden; that it is not permitted for anyone to leave the Swedish Church withouth stating his intention to become a member of some other Christian body; and that dissenters, as well as others, must contribute to the support of the Swedish Church, as being an institution of an educational character in the service of the state, its officers having, too, purely secular duties in addition to their religious ones.

Creed and Cultus. The pure evangelical doctrine, which the Swedish Church professes, is determined, in the Constitution of Sweden, as being that which was accepted and set forth in the unaltered Augsburg Confession of 1530 and in the resolution arrived at by the Uppsala Synod of the year 1593. The Ecclesiastical law, on the other hand, mentions further the whole of the Book of Concord as an exposition of the accepted doctrine, and Convocation in 1893 rejected, by 30 votes to 28, the proposition of the Crown, which parliament had sanctioned, to alter the latter statement in accordance with the former.

The Neological *Handbook* of the year 1811 was replaced in 1894 by a new one, which more faithfully preserves the Lutheran tradition; therewith the choral part of the service has become fuller and more varied. Two fresh series of texts for sermons for the round of the year were issued in 1860, for use with the old ones. The *Hymnal* (of 1819) prepared by *J. O. Wallin*, the great hymnwriter, is still in use.

The *Church Bible* is still that of Charles XII (of the year 1703), but ever since 1773 a Bible Commission has been in existence and has brought forward new suggestions from time to time. Not until 1883 was a new translation of the New Testament adopted, and then not definitely so. Of the Old Testament the translation was submitted to Convocation in 1898, and was almost universally approved, though considered to need some slight alterations; at the same time a revision of the New Testament was also decided upon. — The Exposition of the *Catechism* now ordained dates from 1878; the catechism itself is the small edition by Luther of 1529.

The revival of religious life among the people during the last few decades, in conjunction with the interest for history and the fine arts, has resulted in great activity in the restoration and rebuilding of churches, more especially of cathedrals. Moreover, by procuring superior and more tasteful altarcloths and other

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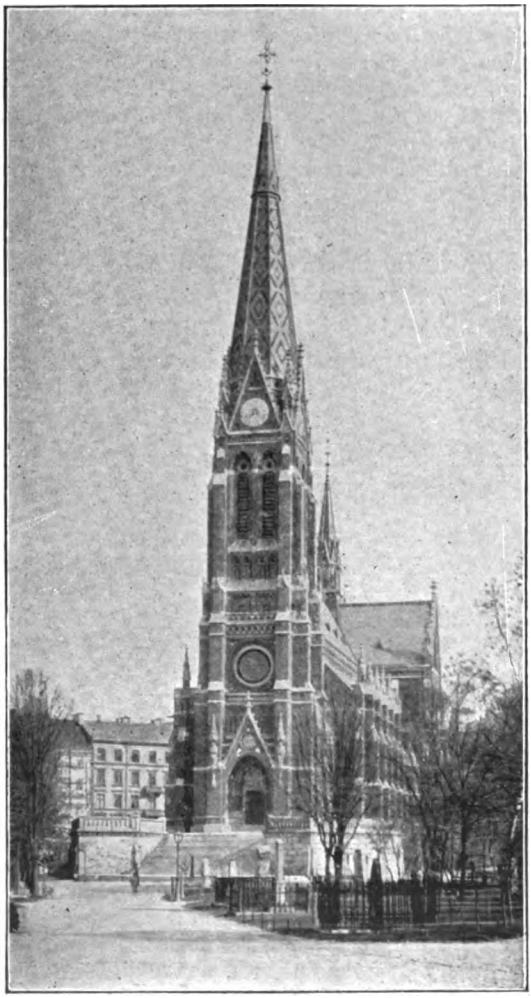
altardecorations, by arranging lithurgical services, and by taking steps to improve the quality of church-singing, the endeavour has been made to direct the attention of those who have come under the influence of the spirit of the Reformed Church, and of those who display indifference to religious matters, to the depth and beauty of the Lutheran services, while at the same time other well justified demands have been met by the institution of services for Bible-elucidation, for mission work, and for children.

Religious Life in Sweden is in our days of a very varied and multiform character. During the 19th century more especially, religious movements have constantly been arising which have left more or less permanent marks upon the life of the nation, numerous parties and sects having been founded that show themselves possessed of life and strength.



St. Johannes' Church, Stockholm.

The earliest of these movements (dating from about 1770) is the *Norrland sect* called »Läsare» — a popular pietistic development with two main branches, one maintaining high church attitude (the Old Läsare), and one of tendencies pronouncedly antinomian and against the State church (the New Läsare). Allied to this movement is the so-called *Læstadianism*, after *L. L. Læstadius* (1800/61), a belief that has been widely accepted by Lapps and Finns, also in Finland and Norway; it is best known by the convulsive movements in which the enthusiasm of the believers finds expression and by the public confession and absolution imposed upon would-be converts. *Schartaunism* is, on the other hand, a product of South Sweden, and its adherents are chiefly to be found in the dioceses of Lund and Gothenburg; it derives its name from *H. Schartau* (1757/1825), curate of the Cathedral at Lund, and is remarkable for the rigour of the Confessional and other High Church proclivities; the most noticeable of these are: dogmatizing, schematic sermons, and the effort to force the method of salvation for the individual into a definite scheme.

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The great awakening that the national misfortunes at the commencement of the 19th century occasioned, was in the main patriotic and literary, but it also exercised some influence on religious life, as the names of the poets Wallin, Franzén, and Geijer suffice to show; about the middle of the century, contemporaneously with the crusade against drunkenness, a national religious movement of great vigour called the *New Evangelism*, arose under the leadership of *K. O. Rosenius* (1816/68). This movement is of a genuinely popular character and represents a pietism of fervent, bright, evangelical type, not much concerned with dogmatic questions or paying much heed to the offices, sacraments, and ordinations of the body ecclesiastical as such, nor yet to the spread of culture but rather to the salvation of the individual, to the community of »the believers» standing apart from »the world», and to the right and duty pertaining to every Christian to spread God's kingdom. In all parts of Sweden, from Norrland to Skåne, societies were formed chiefly among the lowly, for mutual edification and mission work; at great sacrifice private chapels were erected — at the present time there are upwards of 1,500 such in Sweden, worth several millions of kronor — and Preachers (chiefly laymen) were supported, who went up and down the country preaching the gospel, or embarked for foreign parts on the same errand.

To give this great movement cohesiveness, the *National Evangelical Society* was formed in 1856. The basis of that association was Lutheran and ecclesiastical; from it separated »the Free Church Sect», with *P. P. Waldenström* (born in 1838) and *E. J. Ekman* (born in 1842) at its head; this sect constituted, in 1878, a body called the *Swedish Mission Union*, with no form of Confession; thereby occasioning the most serious defection from the ranks of the national church since the days of King Johan III (close of the 16th century). This Union now embraces nearly 1,000 religious communities with a membership of about 80,000 (the National Evangelical Society only embraces from 180 to 190 bodies) — apportioned among 11 districts, each with a President; they have in many cases preachers of their own, who even administer the Holy Communion, and occasionally the rite of baptism, without authority from the Church. Inasmuch as the members of these free-church bodies still nominally belong to the national church, alleging as a reason for so doing that even if they left it, they would still be liable to contribute to its support, the curious phenomenon has arisen of an independently organized free church community existing within the borders of the national church, without, however, any existence in the eye of the law. This awkward state of affairs has occasioned the Church much trouble and anxiety. The question of the legality of baptism as conducted by laymen has especially given rise to keen dispute. An edict from the Crown, dated March 18, 1898, has rendered it essential for every child baptized by any person not in holy orders, save in urgent cases, to be registered in the church rolls as not baptized within the national church.

New-Evangelism, more especially in its most recent, radical phase, bears traces of influence from England and America. As direct offshoots of the Reformed faith may be counted not only some few minor bodies, consisting chiefly of foreigners (the *Anglicans*, about 200 in number, and the *French Reformed Church* with a membership of about 100), but also the following sects, of which certain have gained a very considerable hold among different classes of Swedes during the last 30 years, viz.: *Baptists* (numbering over 40,000), *Methodists* (20,000), the *Catholic Apostolic Church* or *Irvingians* (300), *Mormons*, *Adventists* etc. Of these only the Catholic Apostolic Church and the Methodist Body are recognized by the state as separate communities, their members having definitely left the National Church. The ultra-Methodist body, the *Salvation Army*, can boast of having established 438 corps and outposts and 55 social institutions of various kinds; the staff of officers numbers 859, while of soldiers

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there are 13,042; that is the result of 17 years' work in the country. The *Young Men's Christian Association* (some 110 clubs, membership 7,700) and the *Young Women's Christian Association* (about 50 clubs, membership 4,700) have been introduced from England. The Christian Students' Movement, which has done much to stimulate religious life at Scandinavian Colleges during the last decade, had its origin in North America. A world-wide movement of this kind, called *The World's Student Christian Federation*, was organized in 1895 at Vadstena, Sweden, and since that time a Swede has been chairman of this association. — Adherents of non-protestant faiths are, principally, *Roman Catholics* (about 2,000) and *Jews* (about 3,400). The number of Roman Catholics has of late years considerably increased.

The multiplicity of religious parties naturally gives rise to much dissension and mutual decrying, but at the same time it prompts to a large activity in **mission work.** The *National Evangelical Society* and the *Mission Union* lead the way in regard to both home and foreign missions; they also maintain mission schools of their own. In the foreign mission-field the two bodies maintain respectively about 70 and 50 missionaries of both sexes. The *Swedish Church* has conducted, since 1874, a mission to the heathen in Africa and India, supporting in all about 25 missionaries; the board of management is elected by Convocation and presided over by the Archbishop. There are several societies at work in China, the most prominent among them being the creedless *Swedish China Mission* (25 missionaries). The *Swedish Missionary Society*, one of the oldest of the sort in the country (founded in 1835), works among the Laplanders. A great deal is done to provide sailors in foreign ports with facilities for religious care, and Jews are not forgotten either.

The *Swedish Bible Society* (established in 1815) has since that date distributed Bibles and Testaments to the number of over 1,150,000. — Deaconesses have been appointed in many places, the institution being borrowed from Germany; the *Training Home* at Ersta near Stockholm has been in existence for upwards of fifty years and has become, more especially under the superintendence of *J. C. Bring* (during the period 1862/98), a very important factor in the life of the Swedish Church and one that has been fruitful of much blessing. The Training Home has a membership of about 240 Sisters, 50 of whom holding posts as parish deaconesses. This branch of church service has been gaining ground latterly more and more, especially in Stockholm and the other large towns. Attention is also being increasingly paid to providing improved religious care for the *working people* on the outskirts of large communities, a matter which was crying for more effort, since that section of the people was in a fair way of becoming quite dechristianized. There is still much to be done even in the country districts in the same directions. V. RUNDGREN has calculated that 20 % of the population of Sweden attend the services of the National Church each Sunday and 5 % those of the Dissenting Bodies. Of the total number of those who become confirmed little more than half retain communion with the Church.

A lively communication is kept up with **the Swedes of the United States,** even in a religious sense. As in Sweden, so there, religious factions are numerous. Large numbers of emigrants fail to join any religious body, but the majority of those who are desirous of doing so, become members of the *Augustana Synod*, a body that has upwards of 750 churches or chapels, 453 clergy, and an average attendance on Sundays of 150,000; the annual expenses of maintenance amount to nearly 2 million kronor. The Synod has supported since 1860 a College of its own in affiliation with the clergy Training College on Rock Island in Illinois State; there are 575 students there with a staff of 27 teachers. It is by no means an uncommon thing for the clergymen attached to the Synod to obtain the consent of the Crown to enter the service of the Swedish Church at home.

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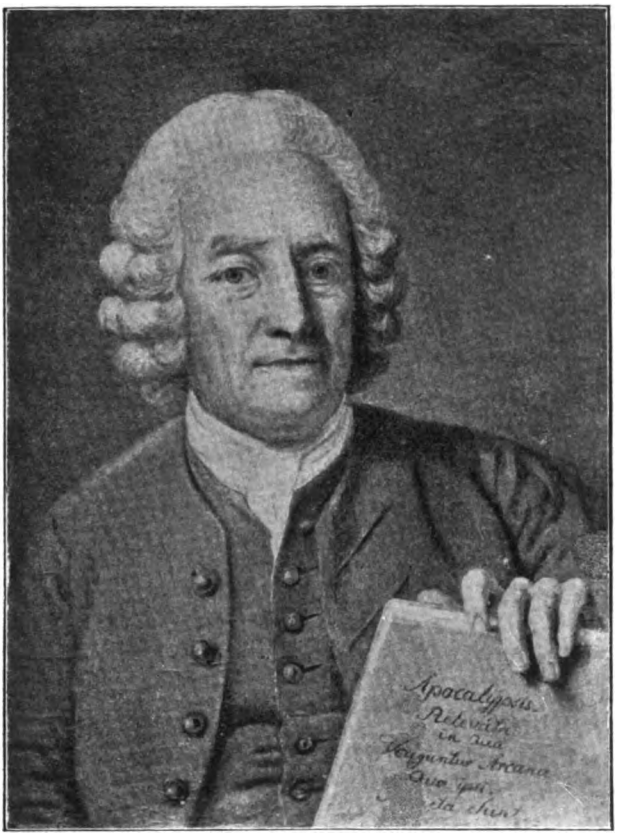
The *Swedish Mission Union* has also numerous adherents among the Swedes in America; many again have joined the Reformed Sects, more especially the *Baptists* and *Methodists*.

A religious movement, which, although it has not very many followers, yet has a special interest for us Swedes in its having emanated from our country, is the **New Church,** founded by the famous *Emanuel Svedenborg* (born at Stockholm in 1688, died in 1772).

The basis of his views on religion is that there exists a far greater correspondence between the lower and higher spheres of Nature than is usually supposed to be the case and likewise between Nature and the spirit-world (the Doctrine of Correspondences). Every advance is brought about only through interior development, and good and truth are in themselves fundamentally inseparable from each other, so that no one can appropriate any truth as his own who does not at the same time acquire the corresponding form of good. Svedenborg conceives the future life as wholly analogous with this present one. He rejects the doctrine of the judgment day and combats the orthodox doctrines of the Trinity and of the Justification.



Emanuel Svedenborg.

Svedenborg, a scientific man too of the highest calibre, pronounced on many topics truths which have not been valued at their true worth until our day — and then under other men's fathership. The general public really only knows his name from his famous »visionary faculty»; but many of the greatest spirits of the latter centuries have come under the influence of Svedenborg's teaching and have acknowledged the debt they owe to him.

The adherents of the New Church are, as a rule, broad-minded people, and expect nothing but gain for their religious views from the progress of scientific research. Thus, both the Religious Congress at Chicago in 1893 and the Religious Science Congress in Stockholm in 1897 were arranged on the initiative of members of the New Church.

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Their fundamental conviction — that truth wins its triumphs solely by *inward* means — has kept Svedenborgians from all crude forms of propaganda, and this will explain to a considerable extent the comparatively small number of those who have openly joined the body. In Sweden the bodies organized as such have a membership at present of rather over 200. In England 7,348 is the number of registered members, and in the United States 7,376; scattered congregations are to be found in all parts of the world.

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5. SOCIAL MOVEMENTS.

In pretty nearly all civilized countries, our time is characterized by deep currents affecting the reformation (or revolution) of society — different to those of other periods inasmuch as they have forced their way down to the very masses. In Sweden, with its high standard of popular education and its old political freedom, these movements have gained great strength, even if in this domain, just as often in others, peculiar features are conspicuous, testifying that the development of our people continues to follow its own course in very many respects.

A movement, which in other countries (hardly as yet, with us) is the most noticeable of these social currents, is the *Labour movement*. For an account of its phases in our country the reader is referred to another section at the end of this work. Amongst other similar phenomena, the religious movement, the woman question, and the temperance agitation have attracted the greatest attention in Sweden.

Concerning the *religious movement*, some data have already been given above under the head Church and Religion. It must be borne in mind that this mighty popular movement has exercised its influence on many departments of our social life. For the first time — at least since the days of Engelbrekt (the 14th century) — a national reformatory movement of wide scope has arisen from the very depth of the masses themselves. It is peculiar to Sweden that this happened, neither on political nor social ground, but on religious. But once awakened, the new life is certain also to acquire other forms than religious ones, — which, moreover, has already proved to be the case.

The educational power of such a movement is very evident. Even from an economic point of view the movement has been a very important one, through its encouragement of industry, saving, and thoughtfulness in money matters. In the religious elements of the community a very high standard of prosperity is nowadays prevailing.

Concerning the *Woman question* and the *Temperance agitation*, an account of each will be given below — a short one because of the limited space.

The Woman Question.

As far as efforts to improve the position of woman are concerned, Sweden stands among the foremost of European countries. If the reason of this be sought, it may be discovered in the fact that, in Sweden, woman even from remotest times has enjoyed greater respect

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than is the case in many other countries. But very probably an additional cause will be — as previously pointed out — a most uncommon supernumerary quantity of women in our country, in consequence of which fact the question about single women's chances of self-support rather early became of actual importance with us.

Even if in bygone times both law and custom to a certain degree secured the position of woman, nevertheless the definite reforms in this respect belong to our own era. Swedish women have since 1845 possessed the same rights of inheritance as men, and since 1863 an unmarried woman is *of age*. At first she attained her majority at the age of 25, but, since 1884, at 21, or the same age as is the case of men. A widow is in the state of majority whatever her age may be.

The position of a *married* woman continues to be less favourable. She is still subjected to the guardianship of her husband and thus, actually, a minor. The husband has in most cases the right to administer her property. However, according to the statute of 1874, this right is so far restricted that the wife can, by means of a contract drawn up prior to her marriage, obtain the right of administering her own property, or a certain part of it, personally; she has this right likewise with regard to what, under the same conditions, comes to her by way of inheritance or gift. A married woman has the sole right to manage what she acquires through her own labour. By the statute of 1898, the husband's right to dispose of *real* property belonging to his wife was, moreover, in certain respects curtailed, and the wife's liability for her husband's debts contracted after marriage, has been limited, besides which the wife has been provided with greater facilities than previously for obtaining a separate estate decreed by law (boskillnad), and by such means the right to manage her own property herself.

During the last decenniums an important revolution has taken place in woman's *sphere of labour*. Woman's capacity for work, which formerly found ample field in the manifold occupations of the household, became superfluous in many places, owing to the development of industries having caused such work to be executed far cheaper at factories. The problem which now became more and more pressing was how to utilize in another way the capacities for work set free by such causes. With regard to women of the lower classes, this was easy enough, on account of the situations offered them at the factories. Again, with regard to the higher classes, a special *training* was obviously demanded for new fields of labour, and opportunities in this direction have also during the last fifty years been afforded on a large scale.

A great number of private colleges for girls have been established with rather considerable State grants, and the State itself supports a Training School for lady-teachers at these schools and several Training Schools for female teachers at the common schools. In 1856, women obtained admission to the conservatory at the Academy of Music, and in 1866 to the one at the Academy of Fine Arts. In 1870, the Universities were thrown open to females, and during the period 1871/1900, 605 women in all have graduated from the colleges. In 1870, women got the right to enter into the faculty of medicine, in 1873, they were privileged to pass all university examinations (except in theology), and at present we have in Sweden 3 lady Doctors of Philosophy, and 9 lady Doctors

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of Medicine engaged in the practice of their profession, as well as a lady Doctor of Laws (appointed lecturer at the university of Uppsala). Incidentally it may be mentioned that the Stockholm Private University was the first in Europe to appoint a woman (Mrs. Kovalevski) professor. — Since 1864 women have been admitted to the Central Gymnastic Institute. In the Postal and Telegraph services women have received appointments since 1863, and in the railway service since 1869. The number of women in banks, counting-houses, and Government offices is largely on the increase, and in the ranks of common-school teachers women form a constantly increasing majority. For the training of sicknurses a most extensive activity has been carried on in later years, about which work see above under the heading Hygiene and Care of the Sick.

Unmarried women, and, under certain conditions, married women too, have the right to carry on trade and manufacture, mechanic art, and other business, and there is no law restricting their right to engage in factory or professional work.

Peculiar to Sweden is the law of Woman's suffrage that entitles her, under certain conditions, to vote at *communal elections*. Already in the eighteenth century, women possessed of real property had this privilege, which was then, however, of small importance, and since 1862 women paying taxes to community vote on the same conditions as men. The number of votes depending on the amount of taxes (see page 250), the women, however, in general remain in the minority, and have therefore only slightly been able to make their influence of any validity. At all events, however, this is a privilege which, in Europe, Swedish women only have shared with those of England and Finland. Quite lately a similar privilege has in Norway been granted to women, — here still more extended than in the countries just mentioned.

Through their participation in communal elections the women of Sweden indirectly elect also members of the First chamber of the Riksdag — a circumstance quite unique in Europe, even though it be of little practical importance as long as voting women are so few in number. More important is that since 1889 women can be elected as members of School Boards and as Poor Law Guardians. In *private* associations of all sorts a continually increasing number of directorships are filled by females.

Swedish woman develops a considerable activity in *charity work* as e. g. within the Charity Organization Society and the Association for children's workshops, as well as through various societies tending towards the preservation of public morality etc.

Women themselves have considerably contributed to the by no means despicable results achieved in the sphere of the »Woman Question» by means of an energetic and well-directed agitation.

During 1873/96 the *Society for vindicating the proprietary rights of married women* worked assiduously to improve the position of woman. In 1896, *Swedish Women's National Council* was founded, by means of which Swedish agitation to promote the interests of woman has put itself into communication with similar exertions in other countries; this society, namely, constitutes the Swedish section of the International Council of Women, founded in 1888.

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Swedish Women's National Council has for its object to promote the collaboration between societies, the Boards of which admit female members. Hitherto twelve associations, with a total number of more than 11,000 members, have joined the league, amongst which may be mentioned: the Fredrika Bremer Society (see below), the Friends of Handiwork, the Charity Organization Society, Swedish Women's league for Sweden's defense, Swedish Women's Peace alliance, Swedish Women's General Society for the prevention of cruelty to animals, etc. The Council has to represent Sweden at the quinquennial congresses held by the International Council of Women.

At present, the activity for elevating women's position is being more and more concentrated in the *Fredrika Bremer Society* deriving its name from the illustrious lady novelist who was one of the first to agitate for the emancipation of women in Sweden. Among the founders of this Society is foremost to be mentioned Mrs. *S. Adlersparre* (1823/95), whose versatile and noble activity also in other respects has been of great significance for the development of the Woman question in our country.

Fredrika Bremer.

The programme of the Fredrika Bremer Society, founded in 1884, is to promote a sound and rational development of the work for the advancement of women morally and intellectually as well as socially and economically. The Society at present counts something like 1,600 members, and is engaged on an extensive and varied field of activity. At the end of 1899, it possessed in scholarships for women studying for the learned professions or for different branches of trade a capital of 236,451 kronor. The Society also publishes a magazine of its own entitled »Dagny». An earlier organ for the Woman question was the Periodical for the Home (Tidskrift för hemmet), published during 1859/85 by Mrs. Adlersparre.

To get their special interests attended to, the *labouring* women have of late years begun to organize themselves into Trade unions for various crafts.

According to statistics the position of Swedish women is, on the whole, rather favourable. One testimony, foremost of them all, is the *longevity* of Swedish women being the greatest observed in any country, and especially during the most active years of their lives the death-rate is low. It has also been pointed out previously, not only that frequency of crime has generally decreased amongst the female population of Sweden, but also that this is the case to a

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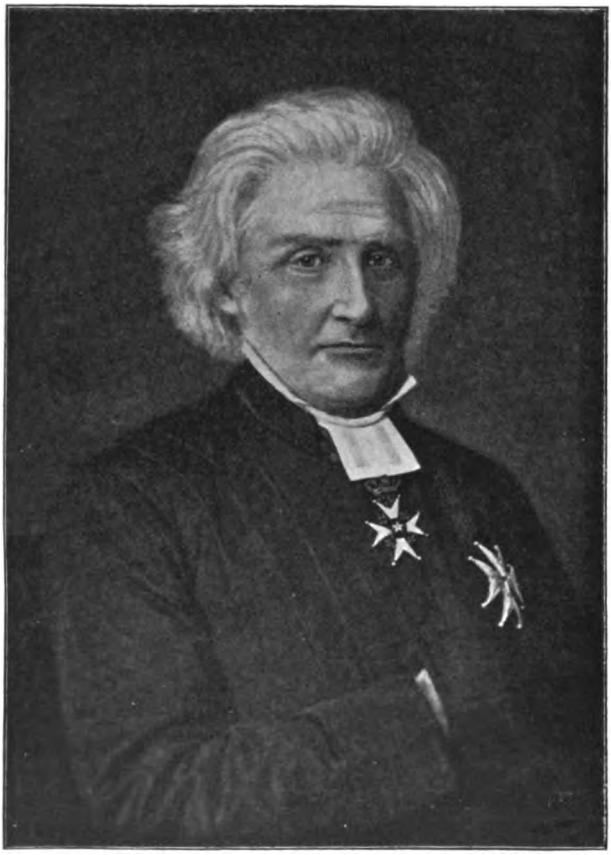
higher extent than amongst men. — With regard to the *wages* paid for women's work, these, as in all countries, keep lower than men's, but still some approach to levelling them has been made. Thus, from 1865 to 1900 male agricultural labourers' wages have risen 95 %, but those of female servants in the country 119 %.

On the other hand, grievances have appeared of late years, especially amongst the younger females. To these belong the tremendous increase of illegitimate births and of suicides amongst younger women, as also the increase of mortality within the female groups of the lower ages — all this being the more remarkable as among women of somewhat more advanced age the changes generally go in the opposite direction. It is obvious that we here meet with the consequences of leaving home earlier than formerly to take situations at factories. The need of taking energetic measures for the support and protection of the new female class of society thus arising in our days, more and more conspicuously stands forth.

The Temperance Movement.



Peter Wieselgren.

It was not till in the latter part of the 18th century that the use of spirits (*bränn-vin*) got more remarkably in vogue in Sweden. The decisive cause leading to this custom was Gustavus III's unfortunate measure (1775) to make the manufacture of spirit a State monopoly, whereby, in order to gain a greater revenue, the people at large were actually urged to contract the fatal habit of consuming spirits. From that time the »spirit river» began to rise shockingly, and was certainly not checked by the abolition of the above-mentioned monopoly in 1798, after which year traffic in it was

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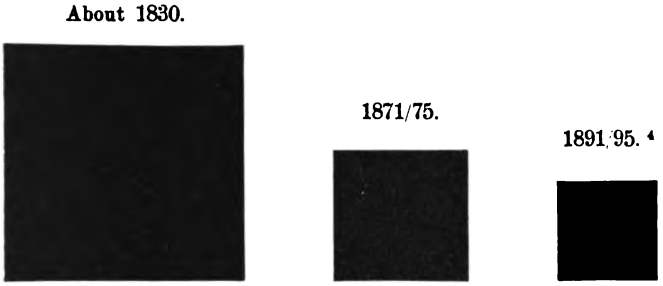
Consumption of spirits[1] *in Sweden.*

Liters à 50 % alcohol, yearly per inhabitant.[2]



allowed to every landowner. The abuse of spirits reached its climax about 1830, when the amount of pure alcohol consumed by each inhabitant is said to have amounted to at least 20 liters per annum, or about five times the figure that denotes its present consumption in Sweden. But that *war against the abuse* had already set in which since has borne so rich fruit, and, in the main, constitutes one of the most beautiful aspects in the history of the Swedish people during the century now drawn to a close.

The war against the abuse of alcohol has a long history in Sweden. The illustrious Linnæus (died 1778) was far in advance of his age in regard to knowledge about the nature and effects of spirits, and proves undoubtedly to have had an eye for the importance of attacking intemperance, both from a social and moral point of view. But the temperance movement first assumed a practical import through *Peter Wieselgren* (born 1800, died 1877 as Dean of Gothenburg), unquestionably one of the most influential and successful champions for temperance that the history of any country presents. In consequence of Wieselgren's powerful agitation, a great number of Temperance Societies were formed all over Sweden, which, in 1837, focused in the *Swedish Temperance Society;* and through his magnificent work as a popular lecturer and writer was created the public opinion which, previous to legislative changes, produced a considerable diminution of drunkenness and finally, after an incessant war of nearly 30 years' duration, led to the *reforms of 1855*, which represent the greatest victory of the temperance movement in Sweden. — Among the champions supporting Wieselgren, mention must be made of the great chemist Berzelius, but more particularly still of *Magnus Huss* (1807/90), the author of the worldrenowned work »Alcoholismus chronicus», which in 1854 gained the prize of the French Academy of Science.

The Liquor laws of 1855, which, though with rather considerable alterations, form the basis of Swedish legislation on the subject even at the present day, contemplated the suppression of drunkenness by restriction with regard to distillation as well as sale of intoxicating liquors.

With regard to the **distillation**, the aim was to transform this into a trade carried on exclusively *on a large scale.* For this purpose

[1] Intoxicating liquors of 25 % alcohol or more. — [2] A liter = 0·22 imp. gallon = 0·264 winch. gallon. — [3] Approximative evaluation, possibly low. — [4] In 1896/1900 somewhat higher, or 8·04 liters; see p. 284.

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a rather heavy excise duty was imposed — of 19 öre per liter of spirit,* which duty already in 1857 was raised to 23 öre, in 1867 increased further to 27 öre, in 1871 to 31, in 1879 to 38, in 1882 to 40, and, finally, in 1888, to 50 öre. In addition to this, a minimum manufacture of about 8 hectoliters of spirit per diem (reduced in 1871 to about 5 hectoliters; an hectoliter = 22 imp. gallons) was enjoined. To limit this manufacture still further, the same was only allowed for 2 months in the year — a period, however, afterwards extended several times, and since 1871 comprising 7 months.

How the distillation of spirits in Sweden, also has become concentrated only on a few greater factories, replacing the »home distillation» of former times, is shown from the fact that the places where spirit was made, amounted in 1829 to 172,124, and in 1850 to 43,947, whereas their numbers in 1861 were come down to 590, and in 1900 to 131. In 1829, the average amount manufactured at each distillery can probably not have exceeded 7 or 8 hectoliters, and in 1850 it was about 20 hectoliters; whereas, in 1861, it had risen to more than 600 hectoliters, and in 1900 to nearly 3,500.

With regard to the **sale of spirits**, the legislation of 1855 left the *wholesale trade* free, while limiting it to 40 liters. As this regulation was evaded by collusive clubbing, the minimum was later on raised to 250 liters (i. e. 55 imp. gallons). The sale in smaller consignments was divided into retail- and bar-trade. The *retailer* was not allowed to sell a smaller quantity than 1·3 liter of spirit (now 1 liter, or 0·22 imp. gallon), and that only for fetching it away, not for consumption on the spot. The *bar-trade* again means the actual public-house business.

Both retail and bar-trade can only be carried on *with the consent of the community*. The Governor can, however, for short periods grant a license to sell by retail for consumption on the premises — at watering-places, on passenger steamers etc., though now no more in places where troops are massed. With regard to the times for opening and closing public-houses, etc., minute injunctions, which have gradually become more and more stringent, have been laid down.

At present, spirit retail business may only be carried on, on week days between 8 a. m. and 7 p. m., and bar-trade likewise on week days from 9 a. m. to 8 p. m. (in towns till 10 p. m.); on Sundays spirits may only be served at mealtimes to guests who are taking their meals. These regulations can, however, be somewhat modified by the Governor or the communal authorities, when necessitated by special circumstances. — Spirits are not to be sold to minors or persons intoxicated, and no claim incurred by selling spirits upon trust can be recovered in court.

A considerable *tax* is imposed on the sale no less than on the make of spirits, at present levied at the rate of 15 öre per liter* on the amount of spirits at which the publican offers to be assessed. Where the community has permitted trading in spirits and this is not handed over to

* Here and everywhere below is meant spirit holding 50 % alcohol. An öre = 0·132 penny = 0·268 cent, or 7½ öre = 1 penny. An öre per liter = ⅜ penny per imp. gallon = 1 cent per winch. gallon.

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»companies» (*Bolag*) according to the Gothenburg system, the license is namely given to the highest bidder, on condition, however, of the Governor considering the individual in question »fit and proper», i. e. that he personally inspires confidence.

Public House of the »Bolag» in Gothenburg.

The rule as to handing this license over to the highest bidder may, from a temperance point of view, appear rather hazardous. Practically, however, it is not of great consequence, since, as far as primarily concerns the *towns*, these have for the most part now adopted the so-called Gothenburg system (see below), and have consequently come under different regulations. As regards the *country*, the right of the communities to forbid the sale of spirits has practically led to the disappearance of public-houses within large districts. In all the country-parts of Sweden, with four millions of inhabitants, there are at the present time only 143 spirit-shops, 86 of which depend on ancient privileges not yet expired. In four of our Läns there is not a single public-house to be met with in the country district. In North Sweden, where especially public-houses are rare, the vast distances, however, cause considerable difficulties in the attempts to suppress *shebeening*.

In towns, matters are vastly different to what they are in the country. Not a single town community has felt capable of doing without bar-trade. Thus, in this case, the legislation of 1855 was ineffectual in producing such great changes as might be desirable. The perception of this gave birth to the so-called Gothenburg system, which more than anything else in Swedish spirit legislation has attracted the attention of foreign nations.

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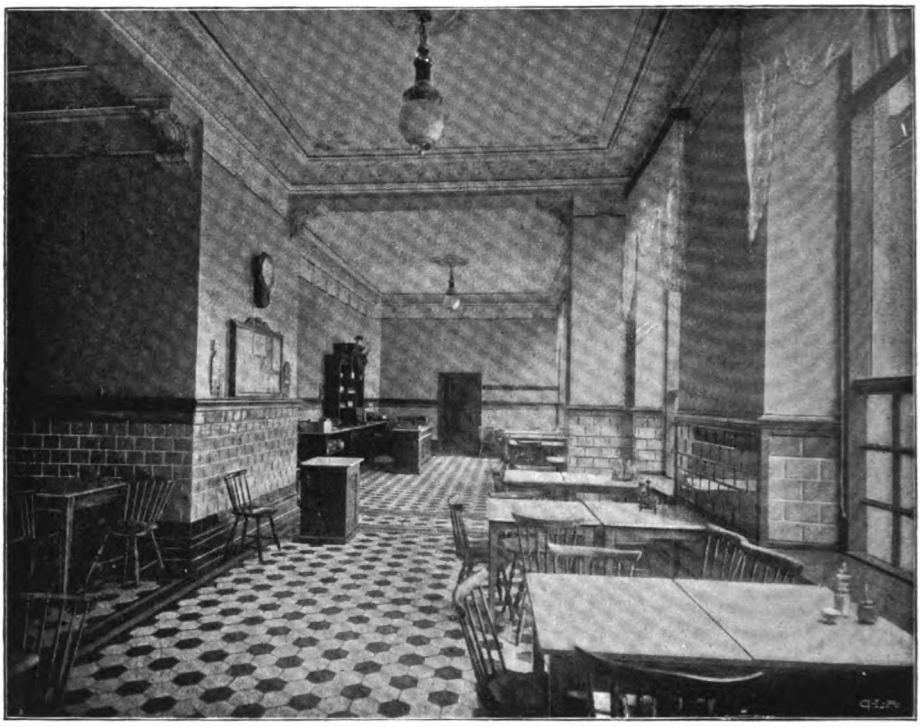
The Gothenburg system was really devised in Falun as far back as 1850, but was not more fully developed till in 1865, in the city which subsequently gave rise to its name. The principle of this system is that in each community the spirit traffic is entrusted to a **company** (»*Bolag*»), which only receives ordinary interest on its invested capital, and hands over the balance of its profits to be employed for purposes useful to the community.



Dining-room of the »Bolag» in Gothenburg.

The first consequence of these regulations is that the company as such has no interest in extending its business, on which account it is a common occurrence that such companies leave part of their rights of sale unutilized.[1] As, moreover, food has to be served at every public-house, and the publican has a commission on this as well as on non-alcoholic drinks, but not on spirits, it is in his interest not to encourage the sale of spirits. A number of detailed regulations are also given in many places with the object of preventing an immoderate consumption of spirits.

This is particularly the case at *Gothenburg*, where the system on the whole can still be seen most completely carried out. Here, the sale of spirits (just as in Stockholm and at certain other places) is forbidden also to buyers between the age of 15 and 18, while the common law only forbids selling to children under the age of 15. The serving of spirits stops at 6 p. m. in winter, and at 7 p. m. in summer, although, according to law, it might go on till 10 p. m. The public-

[1] It ought, however, to be pointed out that the companies *can* transfer a license to private people against certain rents — a circumstance which of course constitutes an exception from the complete carrying out of the system.

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houses are large, airy, and bright, whereby cleanliness and order can be observed. Good and cheap *dining-rooms* have been erected where only one glass of spirit is served at meals. Besides this, there are seven *reading-rooms* established in different parts of the town, to which some 300,000 visits are annually paid. *The profits* derived from the companies' traffic in spirits were originally employed for such purposes concerning the welfare of the working class as the community was not under any legal obligation to take cognizance of. Soon, however, a change took place, and the amount was paid into the general fund of the community. This was undoubtedly a step in the wrong direction. Nevertheless, it proves of somewhat minor importance than is commonly supposed, inasmuch as the boundary between the community's obligatory and voluntary expenditures must always be vague and indefinite, and the employment of the revenues derived from spirits will consequently, in any case, serve as a pecuniary relief to the community as such.

With regard to the principles and effects of the Gothenburg system, there exists already a whole literature. *S. Wieselgren*, Director General, has published several accounts of it in Swedish (partly also in French and English); of foreign works is especially to be noted the minute account compiled by the *Department of Labor* in Washington, which, under the title of »The Gothenburg system of liquor traffic», forms part of its series of Sociological reports. As regards Sweden, where the system is now introduced in 87 out of the 92 cities of the kingdom, and in 11 boroughs (which result, however, is partly explained by the legislation granting certain pecuniary privileges to places adopting this system, for which see below), its beneficial effects cannot well be disputed. In 1870, there were thus on every hundred thousand of inhabitants in the towns of Sweden 216 retailers' and permanent public-house licenses, whereas in 1900 there were only 80; and during the last twenty years, the consumption of spirits per inhabitant has gone down in Stockholm about 40 % and in Gothenburg about 45 %. The system, however, to work properly no doubt demands a vigilant public opinion and a vivid sense of responsibility with the authorities of the community. Where these conditions are absent, abuses have not infrequently appeared, especially in smaller communities. In order to remedy these, fresh regulations have been introduced in the latest law passed in respect to the sale of spirits (the law of May 24, 1895), which is generally recognized as being very commendable.

The whole number of *permanent* **licenses** for the sale of spirits amounted during the sale-year 1899—1900 to 1,023, of which 293 were retail licenses and 730 bar-trade ones (see page 278). Of the total, only 143 were for the country districts but 880 for the towns. — Besides these, there existed for that year 412 *temporary* licenses (see above), of which 304 for the towns and 108 for the country districts; of those granted for towns the plurality refers to passenger steamers.

Of the *permanent town* licenses, 862 were assigned to »Bolags» and 11 were called in at an auction; the remaining 7 depended upon old, not yet expired privileges. Among the *country* licenses mentioned, 57 were called in at an auction and 86 depending on old privileges.

Out of the 143 *permanent country* licenses 69, or nearly half the number, fell on the two southernmost provinces Skåne and Halland (see the map, page 4). Of the remaining, 15 were to be found in the Län of Elfsborg (see map p. 94), and 8 in those of Stockholm and of Göteborg och Bohus; Småland counted 15, little Gotland alone 6, and the Län of Kopparberg also 6; in the whole of Norrland there were only 5. In the Läns of Uppsala, Södermanland, Gefleborg, and Jemtland there were no permanent licenses to be found in the country districts.

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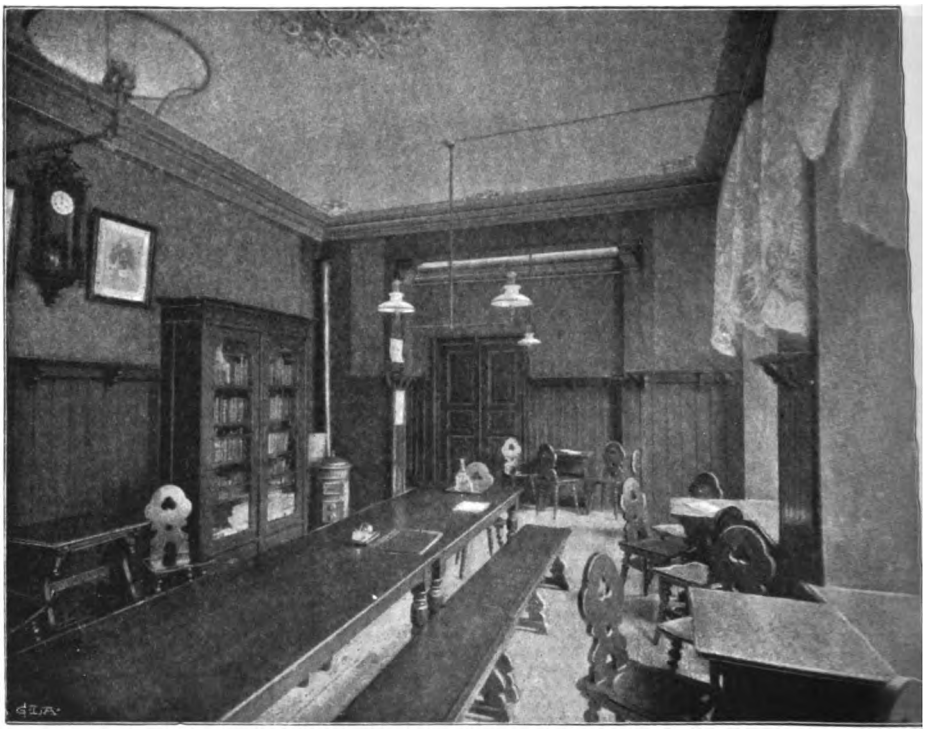
The fees accruing from the distillation and sale of spirits are extremely heavy. Thus, the excise duty on spirits during the quinquennial periods of 1871/1900 amounted on a yearly average to 13·52, 13·26, 13·72, 14·24, 15·03, and 18·55 million kronor respectively (a krona = 1·10 shilling), and the fees for sale (together with the profits of the Bolags) during the same periods came to 2·27, 5·21, 5·47, 6·27, 7·40, and 10·77 million kronor respectively. If the duty on imported spirits be taken into account, the totals will be 17·95, 19·93, 20·54, 21·76, 24·06, and 31·46 million kronor respectively, and in 1900 the total amounted to 35·10 million kronor, of which 20·26 millions were excise duty; 2·44 millions customs duty; and fees for sale together with profits made over by the Bolags, 12·40 million kronor.



Reading-room of the ›Bolag‹ in Gothenburg.

With regard to the *distribution* of these considerable sums, much contro versy has arisen; the regulations now in force are as follows. Fees for manu facture and custom dues go to the State (as has always been the case). Fee for sale and the Bolags' profits may partly be retained by each town individually which share is increased if the town adopts the Gothenburg system; the remainde as well as the fees for sale in the country communities are divided, according very complicated principles (about which see the law on the sale of spirits of Ma 24, 1895) between the County Councils, the Agricultural Societies, a all the country communities — generally in proportion to their population. Duri the five years of sale 1895/1900, the County Councils in this way received

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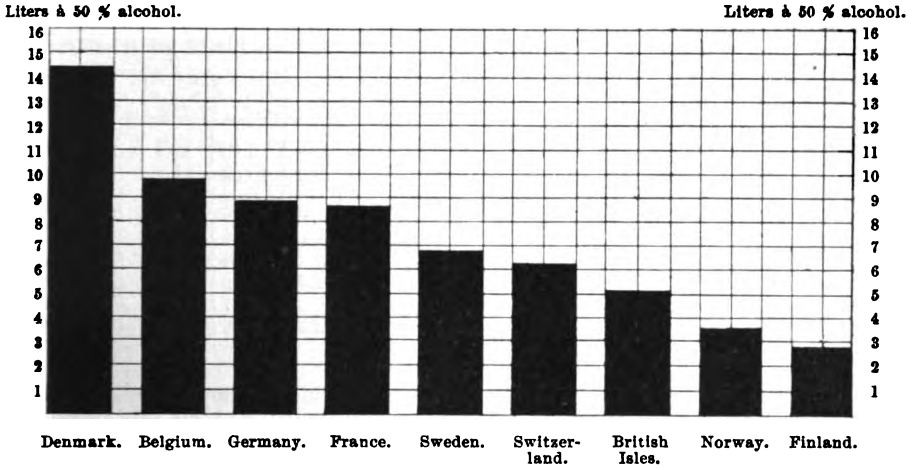
Yearly consumption of spirits per inhabitant, 1891/95.

(A liter = 0·22 imp. gallon or 0·264 winch. gallon).



a yearly average 17·0 %, the Agricultural Societies 12·5 %, the towns 57·9 %, and the country communities 12·2 %; the balance of 0·4 % being spent chiefly in compensation to holders of old privileges of serving liquor. The whole sum thus divided amounted to 10·77 million kronor per annum.

After the laws of 1855 were passed, and the Gothenburg system had gained ground, there followed a cessation in the Swedish Temperance movement, which only re-awakened to life about 1880. The **modern Temperance movement,** however, differs in many respects from Wieselgren's old one, first in having received its impulse and derived its ideals from America, whereas Wieselgren's had sprung up on national ground. The modern movement has been embraced especially by the great masses of the population, whilst Wieselgren's certainly reached these masses also but still had its root among the educated classes. Finally, the modern movement is one of *total abstinence*, and aims at bringing about the *prohibition* of both the make and sale of intoxicating drinks, whilst the old movement was *moderate* (seeking particularly in beer an ally against spirits), and in its legislation had the highest possible regard for individual liberty.

Of the modern *Temperance Societies*, the Order of Good Templars in 1901 counted 104,000 members, which is a larger number than in any other country. An offshoot of the Order, on purely Swedish ground, the so-called National Order of Good Templars, counts in addition 27,000 members; the Order of Templars (sprung up amongst the Swedes in America) 50,000; the Blue Ribbon-men 60,000; several smaller societies 14,000. The whole membership of these total abstinence societies thus comes to 255,000. Besides these, a large number of religious sectarians may be reckoned as total abstainers, some of whom, however, are already included in the above figures. On the whole, it may be supposed that 320,000 total abstainers are actually to be found in our country. These numbers are undoubtedly a singularly eloquent testimony of the vigour which once more characterizes the Temperance movement in Sweden, and it is equally undeniable that the fall in the consump-

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TABLE 44. *Consumption of spirits* [1] *in Sweden during 1856/1900.*

(A liter = 0·22 imp. gallon or 0·264 winch. gallon. An hectoliter = 22 imp. gallons).

Average for the years	Mean population.	Consumption, in hectoliters.			Liters per inhabitant.			
		Spirits.[2]	Beer.[3]	Wine.	Spirits.[2]	Beer.[3]	Wine.	Pure alcohol.[4]
1856/60	3,726,587	354,000	390,000	15,860	9·50	10·5	0·43	5·21
1861/65.....	3,992,560	426,357	446,105	16,543	10·68	11·2	0·41	5·83
1866/70.....	4,165,906	370,057	446,933	17,740	8·88	10·7	0·43	4·91
1871/75.....	4,274,006	505,562	702,867	34,670	11·83	16·4	0·81	6·65
1876/80.....	4,499,900	454,515	767,108	32,608	10·10	17·0	0·72	5·80
1881/85.....	4,604,724	369,364	885,968	31,231	8·02	19·2	0·68	4·85
1886/90.....	4,741,726	338,308	1,151,538	25,824	7·13	24·3	0·54	4·59
1891/95.....	4,831,814	322,405	1,331,442	29,892	6·67	27·6	0·62	4·50
1896/00.....	5,032,074	404,349	1,682,262	33,999	8·04	33·4	0·68	5·42

tion of spirits during 1881/95 is in the main due to the new societies. In the domain of legislation their success has, on the other hand, been less significant, partly from the reason that the new radical proclivities do not easily combine with the regard for individual liberty. At the side of this feature, there has not seldom been conspicuous a more than necessary disregard of the work for smaller, practical reforms that might easily have been carried out. Among the results achieved must, however, be named the above-mentioned law of 1895 respecting the sale of spirits, and the order of 1892 about compulsory instruction in the common schools on the nature and effects of spirits.

A review of the fluctuations in the **consumption** of spirituous drinks in Sweden is afforded by Table 44 and the diagram on page 277; cf. also Table 29, page 154, and the diagram page 283. It ought to be mentioned that during late years the consumption of spirits has again considerably increased (in 1900 to 8·7 liters per inh.), which partly at least must be ascribed to the uncommonly favourable economical conjunctures. As to the evident and since long prevailing increase with regard to the consumption of *beer*, it must be borne in mind that the use of this drink is, nevertheless, smaller in Sweden than in most countries of Europe (see Table 29, p. 154). Beer, however, is very often used in Sweden as an intoxicating drink, and is, therefore, violently assailed by the new total abstinence societies, which, among other objects, are working to bring about an alcoholic limit between weaker and stronger malt-drinks, a close control on the latter, and separation of the beer and wine-trades from other business. A strong opinion exists for introducing the Gothenburg system also into the sale of malt-drinks. One peculiarity for Sweden is that no special duties are imposed, as yet, either on the manufacture or on the sale of beer.

In 1889, the old Swedish Temperance Society (see p. 277) was again reorganized. It is now working on moderate lines, chiefly through the dissemination of tracts, for which purpose a State subvention is granted, and addresses itself particularly to the educated classes. In 1902, the Society has got a great donation, and is directing its work to a great extent to promote higher culture among the lower classes. Its name is now changed into the *Swedish Society for promoting temperance and culture* (Svenska sällskapet för nykterhet och folkuppfostran).

[1] Spirits (»Brännvin») comprise according to Swedish law all liquors containing 25 % alcohol and above. — [2] Reduced to 50 % alcohol. — [3] Including porter and small-beer (Iskällardricka) but not »white beer» (Svagdricka). — [4] The beer estimated at 4 and the wine at 10 % of alcohol.

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Other Humanitary Movements.

The splendid modern system of *cooperation* for effecting a number of Social reforms (often important in themselves even if not, as a rule, comparable with those treated above) is also in Sweden amply represented. A number of these associations are dealt with in this work under the divisions specially devoted to their respective fields of labour. Some few of the rest may here be the subject of a brief notice.

Of the *International Federation*, working for the abolition of legally controlled prostitution, there is also a branch in Sweden.

The Ambulance Societies labour to diffuse knowledge of the best means of help in cases of sudden accident, as well as of rendering such assistance; and with the same object, especially with reference to accidents through drowning, the *Swedish Life Saving Society* has been lately established.

The Swedish Cremation Society has displayed an energetic activity, and crematories are now erected both in Stockholm and Gothenburg.

The Protection of Animals has gained most numerous and zealous advocates, especially among women, and a large number of societies are at work with the object of introducing a better method of slaughter, of educating school children to be kind to animals, etc. The Scandinavian nations in general occupy, as is well known, a high standard with regard to the humane treatment of animals, and this is perhaps especially true of the Swedes with their often bespoken warm love of nature, which also manifests itself as a lively interest in the creatures of the animal kingdom.

Akin to the above-mentioned efforts is the work for limiting and regulating (or abolishing) *vivisection*, which has its center in the Scandinavian Union for opposing the scientific torture of animals.

The work for securing a permanent **Universal Peace,** or the abolition of war and the superseding of it by international tribunals of arbitration, has not gained any great extension in Sweden; still, from a theoretical point of view, G. BJÖRKLUND'S writings have attracted attention even abroad. Quite recently, too, an epoch-making contribution on this field has been furnished by a Swede, the celebrated inventor of dynamite, **Alfred Nobel**, who out of his giant legacy for the furtherance of culture (more than 30 million kronor) has appropriated a fifth for advancing the prospects of peace. Like the remaining items of his legacy, the Peace Fund is administered by a Board composed of Swedes, and having its residence in Stockholm, but the determination as to the employment of this part of the interests is entrusted by the testator to the Norwegian Parliament. The distribution of this sum took place for the first time in 1901, and will henceforward be made annually. For further details see below under the heading the Nobel Institution

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IV.

EDUCATION AND MENTAL CULTURE.

In most respects **education** occupies a high position in Sweden at the present day. The *work of popular education* goes further back in Sweden than in most other European countries. At present, Sweden earnestly endeavours to appropriate all educational advances made by other civilized nations; and in certain respects, especially in regard to physical education, Sweden may even be called the leader.

The close connection between education and the Church is peculiar to Sweden. Equally as often in other respects, so in this too, the History of Sweden defies theoretical calculations, and of the unfavourable consequences to be prophesied at first sight from such a connection as this, only few traces are visible.

Thus Church and School both range under the **Ecclesiastical Department.** Legislation in their interests pertains, where grants of public funds are demanded, to the government and parliament in common; again, in other cases, as regarding ordinances, etc., according to the wording of the constitution, to the government alone (as a branch of the King's »economical legislation»). But the practice has more and more come into vogue for the government to invite the Riksdag to legislate conjointly with it even in these questions, and now no alteration of any great importance is carried through without the consent of the Riksdag. — Under the Ecclesiastical Department the *Diocesan Boards* (bishop and chapter) have the superintendence of all, both lower and higher, public schools in the diocese. This applies also in part to private schools and institutions, especially such as enjoy a state grant.

The costs of public education for 1895 and 1900 are calculated as follows by E. Arosenius, — in Swedish kronor à 1·10 shilling or 0·268 dollar:

	In 1895.	*In 1900.*
Common School Education	16,400,000 kronor.	25,995,000 kronor.
Colleges and Girls' Schools	6,000,000 »	6,365,000 »
The Universities and High Schools	1,450,000 »	2,025,000 »
Technical Education	920,000 »	949,000 »
Total	**24,770,000** kronor.	**35,334,000** kronor.

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Thus, during this period of five years there has been a considerable increase in the expenses for education. The total costs per inhabitant amounted in 1895 to 5·04 kronor, but in 1900 to 6·88 kronor; hence an augmentation of 37 per cent. It should be noted that the cost of professional schools, such as military academies, navigation schools, agricultural and commercial schools, etc., is not considered in the above figures.

Of the costs for public education the State pays about 38 %, while the school-districts, communities, and county councils grant 54 %. Remaining 8 % are derived from the funds of the schools themselves, from term fees, etc.

Regarding **higher culture,** Sweden was for a long time content to follow in the footsteps of the leading nations of Europe. But during the last centuries an independent Swedish conception has gradually forced its way to one domain after another, and especially in our own days this national work of enfranchisement is progressing with ever growing strength. In most fields of literature, science, and art, Sweden now occupies a respected position; and especially is this true regarding the natural sciences.

Special chapters will treat of the work in literature, science, and art. Earnest endeavours are made to promote culture among the lower classes of the nation. People's High-schools and »Labourers' Institutes» work in the interest of a broadened enlightenment, and libraries and collections of great value are being gathered together. Yet, the real People's Libraries are still in their infancy. Among publications aiming to present in a popular form the results of scientific research may be mentioned before others the cyclopædia called *Nordisk Familjebok* (1875/99), which in content as well as volume may fairly be compared with most works of a similar kind published by greater nations. A new edition of this work is under preparation.

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1. POPULAR EDUCATION.

In Sweden, as in other countries, the education of the people was originally purely traditional, every generation delivering orally its collective experience to the one succeeding it. School instruction, properly so called, belongs to a later stage, and in that stage, again, the Common School is younger than the Classical School. Compulsory instruction of the people began in Sweden with the *ecclesiastical law of 1686.*

By this law, all children were compelled to acquire the rudiments of religion. The parish clerk was to teach them to read and the clergy were to catechize them; certain knowledge was especially required for permission to receive the Sacrament and to contract marriage. Through these enactments reading became already at that time in many parts quite a common accomplishment among the people. The result, however, must have been rather irregular, as so much depended on the personal influence of the clergyman.

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In the 18th century the work of popular education was very greatly advanced by the Pietist Movement, which laid great weight on Bible reading, and, naturally enough, was compelled to interest itself in promoting the art of reading. (It is a significant feature that the Pietists in Sweden were always nicknamed simply *läsare*, i. e. »readers»). But even other cultural tendencies of that century, such as utilitarianism, the philosophy of enlightenment, and neologism, highly valued popular education and advanced it in many ways, without, however, effecting a more comprehensive *organization* of the work embraced.

Common School Buildings, Parish of St. Johannes, Stockholm.

During the nineteenth century, the necessity of such an organization as well as of making common schools compulsory was clearly perceived. After several decades of strife, the latter principle was proclaimed by the *first Common School statute of 1842*. It has been the central effort of the half century passed since then to *realize* the principles thus advanced as aims of the future. From the early days of compulsory common schools, the vivid interest and zealous labours of Count *T. Rudenschöld* deserve a place in the grateful memory of the Swedish people. It was mainly due to his influence that in the Riksdag of 1856/58 a further, comprehensive measure was taken, the carrying out of which was later energetically promoted especially by *F. F. Carlson*, Ecclesiastical Minister in 1863/70 and 1875/78. — The Common School statutes now in operation are of December 10, 1897.

The Common Schools in Sweden are primarily the concern of the parish. Nevertheless, they receive considerable assistance from the State and are under the superintendence of State and Ecclesiastical authorities. Every parish constitutes a **School District**, the legislative authority of which is vested in the *Church Assembly* (see page 265).

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TABLE 46. *The Common schools in Sweden.*

Average for the years	Common Schools (see below).					Whereof ambulatory (see p. 294).				Ambulatory in %.
	Higher Common Schools	Common Schools.	Minor Common Schools.	Infant Schools.	Total.	Common Schools.	Minor Common Schools.	Infant Schools.	Total.	
In 1876	12	3,749	770	4,239	8,770	962	301	2,197	3,460	39·3
1876/80	12	3,877	820	4,406	9,115	938	327	2,176	3,441	37·8
1881/85	13	4,162	997	4,617	9,789	867	430	2,044	3,341	34·1
1886/90	11	4,433	1,191	4,713	10,348	803	540	1,803	3,146	30·4
1891/95	12	4,633	1,382	4,891	10,918	745	579	1,640	2,964	27·1
1896/00	15	4,879	1,625	5,156	11,675	673	668	1,405	2,746	23·5
In 1900	16	4,989	1,778	5,198	11,981	620	722	1,278	2,620	21·9

The *School Board* performs the functions of preparatory and executive administration; it consists of the Rector, who is ex officio president, and of at least four other members (male or female), elected by the Church Assembly. Once at least during the school year the President of the School Board is bound to summon the teaching staff to a conference concerning the interests of the common school in his district.

There must be at least one common school in every district. When possible, the school ought to be divided into two departments, viz. the *Infant School* for new beginners and the *Common School proper* for more advanced pupils. For those who have passed through the complete course at the common school, proper arrangements are made in many places for free *Continuation Courses.*

These courses have diverse names and organizations. For pupils who have been through the common school and entered some trade, a so-called *Continuation School* is arranged. This school provides for a yearly instruction of at least 180 hours, distributed on certain evenings of the week, or more centered within one or two short terms. Pupils unengaged in practical work may, on leaving the common school, continue in the *Higher Division* of that School, where extended instruction is afforded. Parallel to this higher division are also the so-called *Higher Common Schools*, of which, however, only a few exist. They are independent institutions of older date than the other continuation courses.

Besides these regular schools, there are others — a sort of provisional institutions. When certain parts of a school district are so remote that the children belonging to it cannot readily avail themselves of the common school, it is allowable to establish in its place *Minor Common Schools* with a weaker teaching staff and a more restricted course.

Common School Inspection. The immediate inspection of the common schools in a school district devolves on the *School Board.* With the consent of the Church Assembly the Board may elect for its assistance a requisite number of *head teachers* and a *communal common school inspector* for the district. The diocesan boards, as ranging above school boards, superintend, each within its district, the conduct and development of institutions designed for popular instruction.

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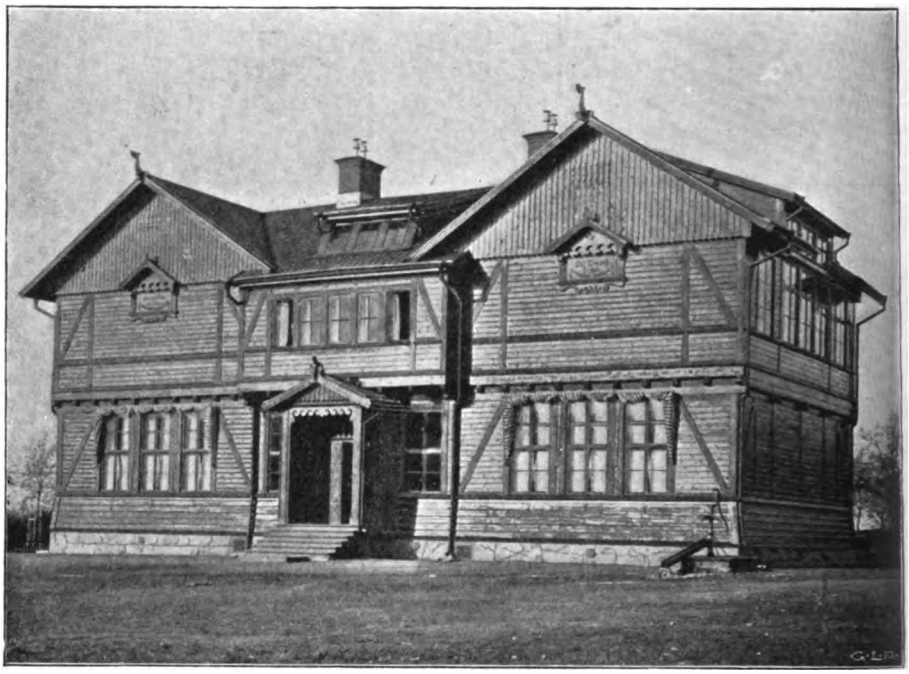

Common School in a Country parish. Huskvarna. (*Jönköping län*). Photo. Hol Jönköping.

On behalf of the State, such inspection and control is further performed by its *Common School Inspectors.* These are appointed for a limited time (6 years) by the government. They are at present 46 in number, and have each a greater or smaller district assigned to them. If the inspector finds defects in the schoolmatters of his district, he reports the case to the school board. If this leads to no result, he may further report to the diocesan board. When a new common school building is to be erected, he should express his views regarding its location as well as the suitableness of its rooms and playground. An important part of the functions of school inspectors is to investigate the petitions of school boards for State grants and to testify that the conditions for such grants are fulfilled by the districts.

For each of the first five years of their inspectorship the inspectors ought to submit brief reports of their work to their diocesan boards. After the sixth year they are to give fuller accounts to the Ecclesiastical Department. These accounts are printed and distributed to the diocesan boards and to all the school boards to serve for their guidance in the discharge of their duties.

Teachers at common schools are either common school or infant school teachers (see above under Schools). The former are partly male and partly female, the latter almost exclusively female. Male and female teachers have about the same rights and duties.

The competency of common school teachers is acquired by passing an examination at some State seminary for common school teachers. In Stockholm, where infant school classes are not regarded as distinct schools, instruction is imparted in them exclusively by female teachers with this

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TABLE 47. *Number of Teachers and Pupils in the Common Schools.*[1]

Average for the years	Mean population.	Teachers.	Id. per 10,000 inhab.	Teachers.		Whereof in the Common Schools.[2]		Pupils.	
				Men.	Women.	Men.	Women.	Total.	To each teacher.
In 1876.....	4,407,000	9,627	21·8	4,926	4,701	3,648	592	634,400	65·9
1876/80.....	4,500,000	10,211	22·7	5,003	5,208	3,796	688	636,500	62·3
1881/85.....	4,605,000	11,738	25·5	5,155	6,583	4,057	1,066	653,132	55·6
1886/90.....	4,742,000	13,065	27·6	5,362	7,703	4,332	1,471	685,655	52·5
1891/95.....	4,832,000	14,296	29·6	5,516	8,780	4,535	1,881	706,903	49·4
1896/00.....	5,032,000	15,890	31·6	5,633	10.257	4,786	2,434	737,217	46·4
In 1900.....	5,117,000	16,630	32·5	5,717	10,913	4,922	2,649	741,959	44·6

higher certificate of study. For an appointment as *infant school teacher*, graduation at a seminary established for that purpose is required, as a rule. In the so-called *exercise subjects*, i. e. drawing, singing, gymnastics, gardening, and sloyd, instruction is sometimes given by specially appointed teachers, but, as a rule, these subjects are taught by common school teachers.

The examinations for common school teachers can be passed only at the **Seminaries for common school teachers.** The number of such seminaries is at the present time 13, viz. 7 for male and 6 for female students. To every seminary belongs an Exercise-School (Öfningsskola), which must contain an »infant school department», and, where practicable, also a »higher division of the common school», or a »continuation school» (see above, p. 289).

The teaching staff of a seminary is composed of a rector and at least four adjunct teachers together with masters of drawing, singing, music, gymnastics, garden management, planting, and sloyd. Moreover, a sufficient number of teachers should be allotted to the Exercise School. With regard to Seminaries for women, at least one adjunct teachership must be held by a woman, and the instruction of gymnastics and needlework (preferably also of music and singing) ought to be conducted by female teachers, and the exercise school should have female teachers. With respect to qualification, salaries, and pensions, seminary teachers rank on the whole with College teachers; but those at exercise schools with those at common schools.

To *enter* a seminary the candidate must be 16 years old, and show on examination that he or she has acquired a tolerably complete common school education. The instruction is free. To poor and clever pupils who have shown commendable industry and good behaviour, scholarships (the maximum 150 kronor per annum) are awarded.

The seminary *course* extends over four years. Of the total number of teaching hours 13·8 % are allotted to instruction in the Swedish language, 13·2 % to Religion. Of the remaining subjects, Mathematics, History, and Geography each take up 9·2 %; Pedagogics and Methodics 7·9 %; Natural Science 7·2 %, and exercises in the practice of teaching 6·6 %. To these must be added Copywriting with 2·0 %; Drawing with 5·9; Music and Singing with 7·9; Gymnastics with 7·9; Sloyd with 7·2, and Gardening and Planting with 2·0 %.

[1] Common Schools of every kind, see Table 46. — [2] In the so-called Common Schools proper, see Table 46. Teachers in exercise subjects are included in the preceding coll., but not here; the number of such teachers in 1900 was 1,006, whereof 350 men and 656 women.

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The Examination for Infant School Teachers takes place, either at the state seminaries for common school teachers or in special infant school teachers' seminaries. At the *State Seminaries* it may be passed by those who have gone through the first two classes of the seminary and have obtained a certificate in Religion, Swedish, Arithmetic and Writing, Pedagogics and Methodics. The examination here consists of a practical trial in the infant school department of the exercise school. A special *Seminary for Infant school teachers* can be established by the County Council, the School district, or by private persons. It must be attached to an infant school. The course of instruction extends over eight months at least, divided into two terms. The final examination, which cannot be passed before the age of 18 (and, as a rule, not after 30), shall take place under government control.

At every common school there must be at least one male or female teacher *in ordinary*. This post can only be applied for by a person who is qualified as a common school teacher. The candidate's application is examined by the School Board, which can call in one or more of the candidates to show his ability, and then nominates three of them ranking according to merit. The election takes place at the Church Assembly.

A permanent common-school teacher cannot be dismissed, unless he has shown lack of ability or carelessness in the execution of his duties, or has misconducted himself to such an extent that he ought not to be retained any longer. In such a case, the School Board must officially warn him; but if the warning prove idle, then the Board can dismiss the culprit from his appointment. After the warning and dismissal, the teacher can appeal to the Diocesan Board, and, last of all, to the Government.

Non-permanent teachers are of four kinds, viz. *supernumeraries*, who teach at common schools and are qualified as teachers in ordinary; *assistants*, who also teach at common schools, but lack the regular qualification; *minor common school* or *infant school teachers*, who are only required to possess qualifications for the infant schools; and *exercise masters*. Non-permanent teachers are accepted by the board on conditions mutually agreed to, for a definite time, or until further notice. With regard to teachers at infant schools, the church assemblies and school boards are empowered in the regulations to make provision that such teachers receive a more fixed appointment.

The salaries for common-school teachers in ordinary are, in the first grade, at least 700 kronor (a krona = 1·10 shilling = 0·268 dollar), in the second at least 800, in the third at least 900, and in the fourth at least 1,000 kronor, with an advance to the second, the third, and the fourth grades after five, ten, and fifteen years' service respectively. To these must be added residence and wood for fuel (or a money compensation in lieu of it). This salary brings with it the obligation to teach during eight months in the year. Every additional month's teaching is paid for by an eighth part of the teacher's ordinary cash salary. In addition, a teacher in a continuation school for 180 hours a year (see p. 289) enjoys a special salary of 150 kronor. For teaching sloyd the salary is fixed at the discretion of the school district.

The minimum remunerations quoted above are the same for teachers of either sex. In towns, as also in many places in the country, the school districts usually assign considerably higher salaries, in which case male teachers, as a rule, are paid more than female.

Teachers in ordinary are entitled to a *pension* of 750 kronor from the Common School Teachers' Pension Institute, to which *the school district* contributes an annual subscription. On the other hand, teachers personally subscribe to

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the Widows' and Orphans' Fund, from which those left behind draw a pension. Also non-permanent teachers and Infant school teachers are now entitled to a pension derived from an »Institution of Relief for the Aged» established for that purpose.

To promote their own interests as well as those of popular education, the common school teachers of both sexes have also formed many private **associations.** Of these the most important is The General Association of Swedish Common School Teachers (Sveriges allmänna folkskollärareförening), which numbers at present something like 7,000 members. Among *periodicals* devoted to the interests of the Common School, the largest is the Swedish Teachers' Journal (Svensk Läraretidning), published in Stockholm, the organ of the above mentioned association.

Pupils. All parents and guardians are bound to see that their children receive instruction. It is the duty of the school Board to attend to the fulfilment of this obligation. The *School-age* is reckoned from the calendar year in which the child reaches the age of 7 till the year in which it reaches 14. Children, however, are exempt from liability to attend common school classes if they receive instruction at some other public institute, or private school, where the teaching is on a par, in accuracy and extent, with that of a common school. Moreover, the school Board can also exempt from attendance at common schools children whose parents and guardians desire to have them educated at home, yet only on condition that the parents or guardians are deemed able to take care of their children's instruction.

As is already mentioned, common schools are divided into infant schools and common schools proper. In the former, the course of studies is calculated, according to the official plan, for two years, in the common school proper, for four years; consequently, the *compulsory school period* is fixed by the school Board in most districts at 6 years.

Children deficient in required knowledge after passing through the common school, are still, in so far as they possess normal capacity, held to attend school, even if they have passed beyond the limit of the so-called school age. In certain cases, however, exemption from this rule is made, in the way mentioned below as »minimum curriculum», under the heading Teaching (page 297).

No children must be prevented by other employment from going through the infant and common school proper, nor by the poverty or unwillingness of their parents or guardians either.

Employers who make use of children's labour must so arrange their work as not to prevent the latter from receiving the prescribed instruction. When parents or guardians lack the means of paying for their children's clothes and maintenance at school, they should be helped by the Poor Law Board. In the event of parents or guardians refusing to comply with the orders of the school authorities, or neglecting to keep their children at school, they should be warned. If the warning prove ineffectual, the children can be sent away from home and entrusted to the care of others, the expenses of their support being exacted from the parents or guardians.

Teaching. The plan of instruction is fixed for every district by its school Board under the guidance of a »Normal Plan» drawn up by the Ecclesiastical Department. The rule is that the annual period of instruction for every *school* shall extend over eight months (34½ weeks) at least.

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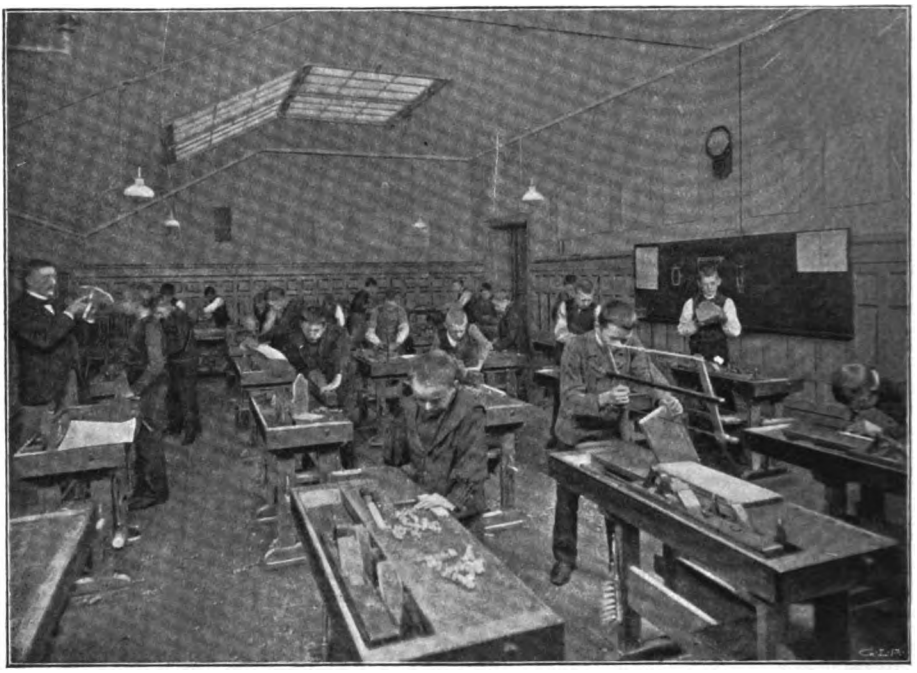
This order, however, does not involve that every *child* receives so long a period of instruction. Certainly, it is prescribed that common schools ought *properly* to be »stationary», but when local conditions or want of means prevent the establishment of such schools, the instruction of children may be provisionally provided for by »ambulatory schools». In many instances it thus happens that a school district is divided into two wards, and so has two stations between which the master moves. There are even parts of the country where the common school shifts to more than two places. According to the Statute of Common schools, however, the number of wards ought to be restricted as much as possible, so that the teaching in every ward may be annually extended in point of time. On the whole, development has taken such a course that the number of wards has been diminished, and ambulatory schools have become »stationary.» (See Table 46, p. 289).



Sloyd-room at a Common School, Stockholm. Photo. AXEL RYDIN, Stockholm.

But even at stationary schools, the time of study can be divided between different groups of children. In many of them arrangements are made for having different divisions of children taught at different seasons of the *year*. In some, the school year is so divided that different divisions of children are instructed on different days of the *week*. Thus it follows that a very large percentage of common school children only get about 4 months of instruction altogether annually. — With regard to the number of *lesson-hours* a week, the law prescribes that they must in no case exceed 36.

The common school statute prescribes that a teacher's aim should be, not merely to instruct the pupils, but also to educate them. With the latter object in view, they ought, as far as possible, to try to enlist the cooperation of parents.

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The subjects in which instruction is to be imparted are laid down in the common school statute. With regard to the range of instruction in every particular subject, directions are given in the above mentioned *Normal plan*, according to which the course followed in infant and common schools proper embraces:

in *Religion:* stories from the Old and New Testament, Luther's Brief Catechism with its accepted exposition, select Hymnal verses (50—80), perusal of certain books of the New Testament; — in *Swedish:* fluent and accurate reading, exercise in understanding and orally accounting for what has been read, fairly correct orthography, exercise in rendering stories in writing and giving simple descriptions, acquaintance with such parts of grammar as are necessary for following the other instructions in Swedish, proficiency in handwriting; — in *Arithmetic:* the four rules in integers and fractions with their application to practical problems of easy comprehension; - in *Geometry:* drawing, describing, and measuring of lines, angles, triangles, squares, and circles, together with description and measurement of the more simple solid figures; — in *Geography:* main outlines of physical geography, somewhat minute geography of Sweden, a brief survey of the geography of other civilized countries; — in *History:* selected stories from Swedish history; — in *Natural Science:* description of common natural objects, construction of the human body, its functions and preservation, instruction on the most important natural phenomena, and the celestial bodies.

Besides these subjects the instruction iucludes: — *Drawing:* simple freehand-drawing and geometrical drawing; — *Singing:* tunes of hymns and suitable songs, exercises in harmony and tempo; — *Gymnastics:* general gymnastics, exercises in marching and jumping, also, where opportunities admit, simple gymnastics with apparatus; — *Gardening:* instruction in the cultivation of the commonest flowers and vegetables, raising of shrubs and saplings, and their improvement by grafting and pruning.

The above-mentioned subjects of instruction are obligatory. Optional subjects are: for boys, boys' *sloyd;* for girls, girls' sloyd and domestic economy. Where the latter is taught, a *school kitchen* is attached to the school. (See p. 297.) These two optional subjects have become very popular during the last few years. This is particularly the case with sloyd, to which a special article is devoted below.

The plan of instruction in **Continuation Schools** (see p. 289) comprises, among other courses, the following: — in *Religion:* reading of an entire book of the Bible or a portion of such, and Luther's Brief Catechism; — in *Swedish:* composition (stories, descriptions, and the commoner kinds of business correspondence) and oral exercises; — in *Arithmetic:* exercises in applying to mixed problems of a practical nature the four rules in integers and fractions, and the outlines of book-keeping; — in *Geometry:* drawing, describing, and measuring polygons and ellipses and also polygonal and round bodies, etc.; — in *Drawing:* drawing exercises in connection with geometrical instruction and sloyd; — in *History:* further study of Swedish history; — in *Natural Science:* description of minerals, varieties of rocks and earths, and also a portion of the science of natural phenomena.

For the **Higher Division of the Common Schools** and the **Higher Common Schools** (see p. 289) no special courses of instruction are laid down in the official plan. The instruction in this highest grade of common schools is for that reason very different at different places. According to available information, it embraces among other courses, the following: in *Swedish:* reading of selected pieces from the classic literature of Sweden, together with brief notices on the authors, essay writing, outlines of Swedish grammar; — in *Arithmetic:* book-keeping, introduc-, tion to algebra, and easier equations; — in *Geometry:* calculations, constructions

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and demonstrations (corresponding to the three first books of Euclid); — in *Geography:* further exposition of the scenery, the mercantile and social conditions of Sweden; commerce of the world and its highways; climatic conditions and the distribution of the plant and animal kingdom in different quarters of the globe; — in *History:* the most important events in the history of the world, with especial stress on the evolution of civilization and with reference to the connection of Swedish history with the outside world; main outlines of the Swedish constitution; — in *Natural Science:* the most important parts of Physics and Chemistry as bearing on every-day life; Hygiene. Also instruction in Sloyd and Domestic Economy. In various places instruction is given in one *foreign language* (German or English).

From the law requiring every child to pass through the entire curriculum, laid down for the common schools of the district before being entitled to a complete certificate, one exception is made in the statute for common schools. It there says, namely, that pupils who are prevented by poverty from availing themselves of the instruction for the number of years properly required, may »where circumstances demand it» be allowed to leave school if they have passed the so-called minimum. This **minimum** embraces: a) in Religion: Bible History and Catechism as far as necessary for partaking in the parochical instruction preparing for the first communion; — b) in Swedish: fluent and correct reading, with exercises in understanding and accounting for what has been read; legible writing of easy words and sentences, with fairly accurate spelling; some practice in expressing thoughts in writing; — c) in Arithmetic: the four first rules in integers with application to the most practically important problems; introduction to decimal fractions, and addition and subtraction in decimal fractions together with the meaning and notation of vulgar fractions; — d) in Singing (except for those who have no gift for it at all): Hymn and Song melodies. For pupils who have obtained permission, on these conditions, to leave the common school, the so-called *Continuation-Schools* are to be instituted (see p. 289) and parents and guardians should be urged by the school Board to make their children attend them.

Among common school subjects, **gymnastics** — in Sweden according to Ling's system — has for its chief aim the physical development of the children. This is partly the case also with regard to the teaching of gardening and tree-planting, of sloyd for boys, and of domestic economy. For the same purpose, various social-hygienic arrangements, aside from those provided for by the law, have been introduced in several school districts, more especially in the larger towns. Among these may be mentioned the distribution of food to children, the arrangements for school baths, work-rooms, vacation colonies, etc.

In Stockholm, the providing of food to children is connected with the **school kitchens,** in such a way that the food prepared by the school girls in the forenoon serves for dinners to such pupils as would not get a proper meal at home. In some places, poor children get their meals quite free, in several others they have to contribute themselves about a penny towards the cost. The school kitchens, the earliest of which in Sweden were established 1882 by the Lars Hierta's memorial foundation on the initiative of Mrs. Anna Hierta-Retzius, have proved serviceable.

For a long series of years, baths and *swimming lessons* in the summer months have been arranged for common school pupils, both boys and girls, in the largest towns in Sweden. Recently, **school-baths** have been arranged even in winter. Special bath-rooms have been erected in certain schools, and the children there can get a warm bath every third or fourth week. The profiting of such baths is general, though voluntary. This regulation has proved highly beneficial to the children's cleanliness and health.

The **workshops for children** (Arbetsstugor för barn) co-operate with the instruction in sloyd, the distribution of food, etc., to the benefit of the children. They will be described in detail below.

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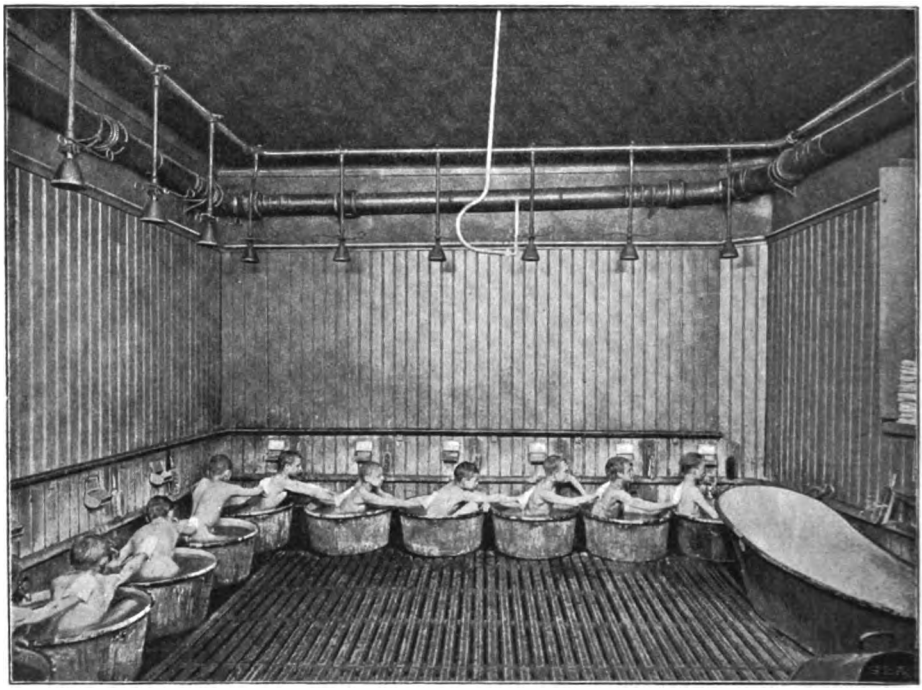
In many of the larger towns it has become customary during the last few years to send poor children who are specially delicate or weak into **vacation colonies** for the summer, there to regain health and strength. These colonies, which are kept in the country, usually in the vicinity of woods and water, are generally superintended by male or female teachers. They were started in *Stockholm* in 1884, and between 1885 and 1900, 356 colonies of altogether 8,751 children, have been sent from that city, exclusive of similar colonies provided for by certain large industrial companies for children belonging to their workmen. Every colony consisted of about 27 children on an average. The average number of days during which each child was kept, amounted to 60·2, and the daily total cost per child came to about 55·3 öre (about 7 1/3 d.). The effects of such colonies on the children's health have been eminently satisfactory. The so-called *mountain colonies* (Fjällkolonier) for children with weak chests are a species of these. These colonies are usually stationed in Jemtland.



School Baths, Stockholm. Photo. Axel Rydix, Stockholm.

Among special measures in the interest of education must be mentioned the supply of *materials for teaching* and the *establishment of school libraries.* A very detailed account has been forwarded from the Ecclesiastical Department to all the heads of schools, of the materials for teaching, which for the requirement of common schools can be obtained by the agency of the Department at a reduced price; and it is laid down in the common school statute that school authorities should promote the establishment and use of school and village libraries, and see that proper books are provided for that purpose.

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Particular places. The foregoing account applies to the actual state of things in general. For certain places, however, the character is slightly different. For *Stockholm* and *Gothenburg* there are special school regulations, according to which all the parishes in each of these towns form a single school district with a common Board. The same is the case in *Malmö*. In the above cities and in *Norrköping*, the teachers are not elected by the vote of the church assembly but are appointed by the school Board. In Gothenburg, matters pertaining to the common schools are not managed by the church assemblies but by the town council.

In the northernmost parts of the country, the people in certain places speak *Finnish* or the *Lapp tongue*, and, in consequence of their sparsity and poverty, have great difficulty in putting common school teaching on a satisfactory basis. The State, therefore, to attain this object, has been obliged to make greater sacrifices here than in other parts of the kingdom. In Haparanda and at Mattisudden, two seminaries have been established out of public funds for training infant school teachers, one for the Finnish, the other for the Lapp children. For such pupils at the common school seminaries as can speak Finnish or the Lapp tongue, and bind themselves after passing their examination to perform the duties of teachers for Finnish or Lapp children, larger pecuniary aids are paid than the ordinary. Many common schools in these regions obtain also a larger subvention from the State, or are wholly maintained by the State.

With regard to the **results** of the common school teaching it has been already shown in a previous section (diagram page 137) that in Sweden, at the present day, practically *all* the young men enrolled as conscripts are able to read, the slight exception of about 1 per 1,000 arising from a few Finns from the extreme north. Sweden has also in this respect gone as far as any other country, and can be compared with Germany and Denmark. The important fact has been pointed out several times in the preceding that this general knowledge of reading is of *ancient* date in Sweden, a considerable part of the people having been able to read a book even so far back as two centuries ago.

Of course, the last word is not said in merely stating that reading is a general accomplishment It will be found that out of all the conscripts in 1900, 69·8 % could read *fluently*, and 30·2 % *fairly well*. There is thus still a large field for progress even with regard to such an elementary subject as reading. That such progress is being made, is proved from the fact that in 1875 only 52·4 % of the militia received certificates of good skill, but, on the other hand, in 1900 — as we have just mentioned — 69·8 %.

The Expenses of Common School Teaching are not met by the pupils but entirely by public grants. For their amount cf. Table 48.

The burden of these expenses falls partly upon the School districts, and partly on the State. The *School district* is bound to erect and support school buildings, provide them with furniture and the materials of instruction, and attend to heating and cleaning; moreover, it must provide the teacher with the statutory allowances in kind and a salary as laid down by law; it also is bound to contribute a yearly fee towards pensioning him. As far as salaries are concerned, it is to be observed, however, that the district generally is *reimbursed by the*

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TABLE 48. *Expenditures for the Common Schools.**

Average for the years	Mean population.	Total expenditure. Kronor.	Per inhab. Kronor.	Heads of expenditure. Kronor.			
				Salaries.	Houses.	Materials.	Others.
In 1876.....	4,407,000	7,662,158	1·74	5,097,231	1,643,986	192,736	728,205
1876/80.....	4,500,000	8,544,495	1·90	5,726,835	1,695,868	215,157	906,635
1881/85.....	4,605,000	10,372,260	2·25	7,117,566	1,700,003	236,736	1,317,955
1886/90.....	4,742,000	12,154,629	2·56	8,460,795	1,822,928	224,330	1,646,576
1891/95.....	4,832,000	14,483,222	3·00	9,679,281	2,391,281	315,688	2,096,972
1896/00.....	5,032,000	18,993,454	3·77	11,696,774	4,017,695	308,609	2,970,376
In 1900.....	5,117,000	23,097,746	4·51	13,124,111	5,829,409	338,358	3,805,868

State with $^2/_3$ of its outlay for salaries. Moreover, the state contributes towards establishing pensions a sum which at the present time amounts to about 570,000 kronor, and it defrays the expenses for the seminaries for common school teachers and also for the inspection of common schools. In the total expenditures for popular instruction, the higher common schools and the schools for the abnormal, the State contributes with about 30 %. — The amount of *donations* for common school purposes amounted in 1898 to somewhat above $5^1/_2$ million kronor.

Educational Sloyd.

Sweden takes an important part in the movement which, directed against exclusive brain-work at school, strives to make systematically arranged manual work an important element of rational education. A Swedish educational sloyd system has been devised and worked out, and afterwards adopted in many other countries, both in and out of Europe.

As early as in the beginning of 1870, definite steps were taken in our country to introduce sloyd instruction, both in already existing schools and in so-called sloyd-schools especially established for the purpose. To begin with, these efforts were supported by private persons, but soon subventions could be counted upon also from communal authorities, county councils, and agricultural societies. The State grant was at first of an indirect nature, inasmuch as the contributions delivered for the purpose by the agricultural societies were furnished to them by the Agricultural Academy.

In 1877, the Riksdag voted 15,000 kronor to the promotion of sloyd instruction for boys. At that time, there were some eighty schools where such instruction was given, and each school received an annual grant of 75 kronor, whereas the number of classes which during 1900 were in receipt of such a grant, amounted to 3,490. This instruction is not, as a rule, compulsory, nor is it of necessity that a system regulated in every detail be adopted. — The total of the grant paid by the Government to those schools where sloyd instruction is imparted to boys, was, in 1900, 261,750 kronor.

* Including Training Schools for teachers, People's High Schools, Schools for the abnormal, and also grants for pensions, the total expenditure amounted in 1900 to 26 million kronor (see p. 286). A krona = 1·10 shilling or 0·268 dollar.

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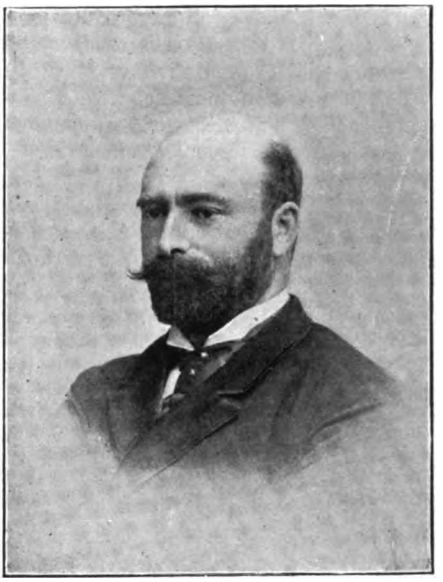
By »Swedish educational sloyd» is meant the system of instruction and the method worked out at the **Nääs Slöjdlärareseminarium**, where most of those Swedish male and female teachers who impart instruction in carpentering have received their training. Sloyd is also taught at all Training schools for male common school teachers, and sloyd courses intended for male common school teachers have besides been arranged in several Läns by the authorities. These courses often stand under the guidance of one of the Government instructors for domestic industry.



Otto Salomon.

The Nääs Slöjdlärareseminarium (director: Otto Salomon) was founded by *August Abrahamson* (1817/98), proprietor of the Nääs estate — situated 30 kilometers from Gothenburg — and it is supported by his munificent donations. It was opened in 1874 as a higher division of the sloyd school for boys, which two years previously had been erected at Nääs. To begin with, courses of one year's duration were arranged for the training of special sloyd teachers; from 1878, shorter courses were, moreover, given for common school teachers, and, since 1882, the instruction consists exclusively of such courses, partly for the training of male and female sloyd teachers, partly for the training of play-masters. Each of these courses at present lasts six weeks.

The instruction is free of cost. The courses include lectures and discussions on the teaching of Sloyd, its educational and historical significance, and on the arrangement of such instruction at schools, in addition to practical work in the Sloyd-room.

Especially the summer courses are attended by many male and female teachers from foreign countries. The total number of partakers in the sloyd courses during the period 1875/1900 amounted to 3,346, who may be divided according to nationality as follows:

Sweden	2,493	Netherlands	37	Spain	1	Argentine	3
Norway	62	Belgium	3	Russia	34	Chili	1
Denmark	57	Germany	24	Roumania	5	Uruguay	2
Iceland	2	Austria	26	Servia	1	Japan	2
Finland	65	Hungary	17	Bulgaria	9	India	5
England	331	Switzerland	3	United States	73	Egypt	3
Scotland	58	France	3	Canada	1	Cape Colony	1
Ireland	6	Italy	16	Brazil	1	Abyssinia	1

Thus the total number comprises 2,493 Swedes and 853 foreigners, of which 93 are from countries outside of Europe. Of the European countries the English and Scotch stand decidely foremost, and of countries outside of Europe the United States of America are foremost.

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Sloyd instruction for educational purposes is in Sweden taught chiefly to boys from 10 to 14 years of age, and that is the reason why at Nääs the sloyd instruction has been limited to Sloyd *carpentry*, as being the most suitable for pupils of that age. In some schools, however, cardboard and metal-sloyd, turnery and wood-carving are also taught. The educational sloyd claims its place at the schools as an element of general education. Its object is not to train cabinet-makers or other artisans. Its aim is, on the other hand, the moral, intellectual, and physical development of the pupil by teaching him orderliness, attentiveness, and perseverance, by training his eye to see better and his hand to work better, and — above all — by giving, together with gymnastics, a healthy counterbalance against onesided book-work. »Quality not quantity» is the motto of pedagogical sloyd, for which reason it does not require of children many and large pieces of work, but the greatest possible accuracy in arriving at a result, which is qaiued by beginning with comparatively simple models and by only gradually, in progressive order, passing on to more complex work.

Sloyd-room at the Nääs Slöjdlärareseminarium.

The Nääs method is based on what is called exercises. By exercises in this connection is to be understood the manipulation of the materials by means of one tool or more, in a definite way, for a definite object. Theoretically spoken, an unlimited number of such exercises may, of course, be conceived, but the question in this case being the arranging of a sloyd method pertinent to practical instruction, a restriction is necessitated, and that is why the Nääs method demands only 68 such exercises. With a good form from an esthetical point of view the objects made must unite a practical purpose, and thus in order to strengthen the bond between the home and the school, hardly any articles but those likely to prove

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useful, either to the children themselves or to their parents, are, as a rule, produced. Articles of pure luxury are altogether excluded.

The educational sloyd will also teach the pupil self-reliance and arouse his faculties of observation and reflection. By letting practice precede theory, and handiwork go before explanations, the child is put into the custom of thinking its own thoughts while doing its own work independently. Contributory to this purpose is the pervading rule that the teacher certainly must carefully lead and supervise the work of the pupils, but, at the same time, be on his guard against more or less carrying out any part of it himself. As far as possible, drawing ought to go hand in hand with sloyd, so that the pupils, after having learnt the first elements of drawing, are allowed to execute their work from drawings. The main object of the instruction being the individual development of the pupil — not the acquiring of technical skill — individual and not class teaching is applied.

Such, briefly, are the principles of the so-called Swedish sloyd system. As we have previously pointed out, the method is not everywhere strictly followed in every detail but the leading thoughts are, however, always the same, both in Sweden and in those foreign countries where it has been introduced.

Workshops for Children.

On April 4, 1886, the Board of the Institution Lars Hierta's Memorial fund (see p. 381) at the initiative of one among its members — Mrs. *Anna Hierta-Retzius* — voted means for the establishment of Workshops for Children, i. e. »a kind of day-schools, where an opportunity is given to poor children during their leisure hours to occupy themselves in a useful way, learn practical work and various trades».

The first workshop was opened on January 25, 1887, in the parish of Adolf Fredrik at Stockholm; similar institutions have been started in the space of a few years in all the parishes of the capital, each with a special Board to organize the instruction and superintend the work, etc. A *Central committee*, to which every Board elects one member, manages the common concerns, publishes annual reports, arranges classes for teachers, lends models for work, etc.

Poor children from 7 to 14, who are not looked after at home, are received in the workshops on the proposal of the board school teachers and are taught there from 11 a. m. to 1 p. m. (the youngest children), and from 5 to 7 p. m. (the older ones). The former get their dinners, the latter their suppers as a remuneration for the work. The cost for the dinner amounts to 8—13 öre, that for the supper to 3—8 öre per child. (7·6 öre = 1 penny).

The staff of teachers consists partly of voluntary, partly of paid lady-teachers and of artisans skilled in their professions. Last year, the number of voluntary lady teachers amounted to 78 and that of paid teachers to 72.

The workshops are managed at a very small cost. They are supported by subventions from the Town council and parish grants, by private gifts, and by sale of the children's works. The income at the annual joint sale of these amounts from 5,000 up to 7,000 kronor (a krona = 1·10 shilling). The annual grant from the Town council for all the workshops of Stockholm amounts to 25,000 kronor, that of the parishes from 300 up to 1,200 kronor for each shop.

While the object of the sloyd pursued at the schools is chiefly a pedagogical one, the work at these shops aims more at *manual skill* and practical usefulness. The boys are taught brush-making, fret-work, wood-carving, basket-work, joinery, tailoring, cobbler's work, and metal work. The girls make slippers, bast shoes,

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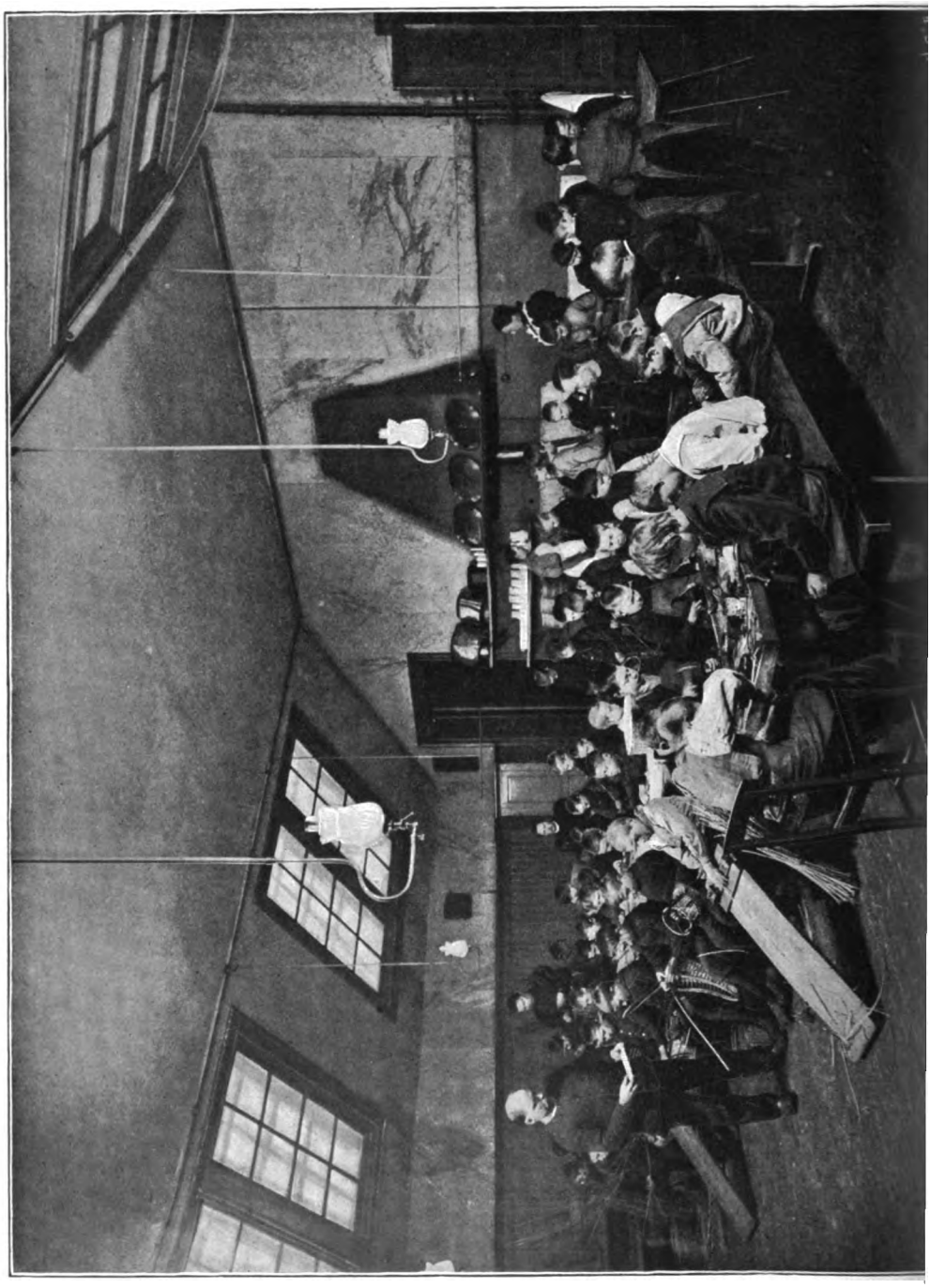

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chip plaits for hats, and baskets; besides, they weave, make dresses and underclothes, etc., and also learn to mend their own garments. In the parishes of Klara and Östermalm, the shops are combined with a school kitchen; in all the shops the children help in the kitchen and assist in sweeping and dusting the rooms.

The children are also allowed to take home materials for sundry easy works, which they do at home and for which they are paid out of the means of the workshop; their wages are put into the Post Office Savings bank for them. On such *home-work*, which is highly in demand amongst the children and given as an encouragement and reward only to the good and most industrious, they can earn from 8 to 20 kronor a term. The average cost for each child in the workshops of Stockholm was during the first ten years 13·70 kronor per annum, but has somewhat increased these last years. The number of children in the 12 workshops of Stockholm is from 60 up to 262 in each.

Workshops have been started also in other Swedish towns, at present reaching the number of 33. They are organized on the same principles as those of Stockholm. At their foundation, they get for the first setting-up a grant of 700—1,000 kronor from the Institution Lars Hierta's Memorial Funds.

During the sixteen years that have elapsed since such workshops began, the moral and educational value of manual training has been proved. The good results of the work have also become obvious and are generally acknowledged. In the capital alone, about 1,600 of the poorest children have in these workshops, during their leisure hours, found a refuge, where they are put to a useful occupation instead of roaming about in the streets and markets and being exposed to the temptation of begging and pilfering. The workshops, where the children besides enjoying motherly care and education, acquire manual skill and quickness of perception and learn useful trades, have proved one of the best *preventive* means against the vagrancy and criminality of the young. Thousands of children, amongst whom many come from the worst of homes, have thus been brought into safety without having had to be taken from their parents and put into orphanages, or reformatory or industrial schools.

Concerning the workshops and the activity displayed in them, minute information is imparted in a work published 1897 by Mrs. Anna Hierta-Retzius.

Education of abnormals, and of neglected children.

Schools for the Deaf and Dumb. About 1760, just when l'Abbé de l'Épée in France and Heinicke in Germany were laying the foundations for instructing the deaf and dumb in these countries, *Abraham Argillander* — without knowing anything of their work — was occupied with the same scheme in Finland (at that time a part of Sweden), and discovered a system which, in its main features, agreed with Heinicke's, and was essentially what is now called the articulation method of the deaf and dumb. After sporadic efforts, a regular system of instructing the deaf and dumb was founded in Sweden by *Per Aron Borg* in 1809. Up to 1864, this teaching (connected with the instruction of the blind) was concentrated at the institution founded by him at Manilla in Stockholm, which soon became a State establishment. Its work was carried on chiefly in accordance with the methods of the French school. During the period of 1864/89, a number of new establishments of a private nature arose, and efforts were made to extend the instruction to *all* deaf and dumb children, and at the same time vigorous attempts were made to introduce the deaf and dumb articulation method. By *a statute* passed on the *31st of May 1889* a new era at last began, which, in respect to the education of deaf-mutes, puts Sweden in the fore-front of European nations.

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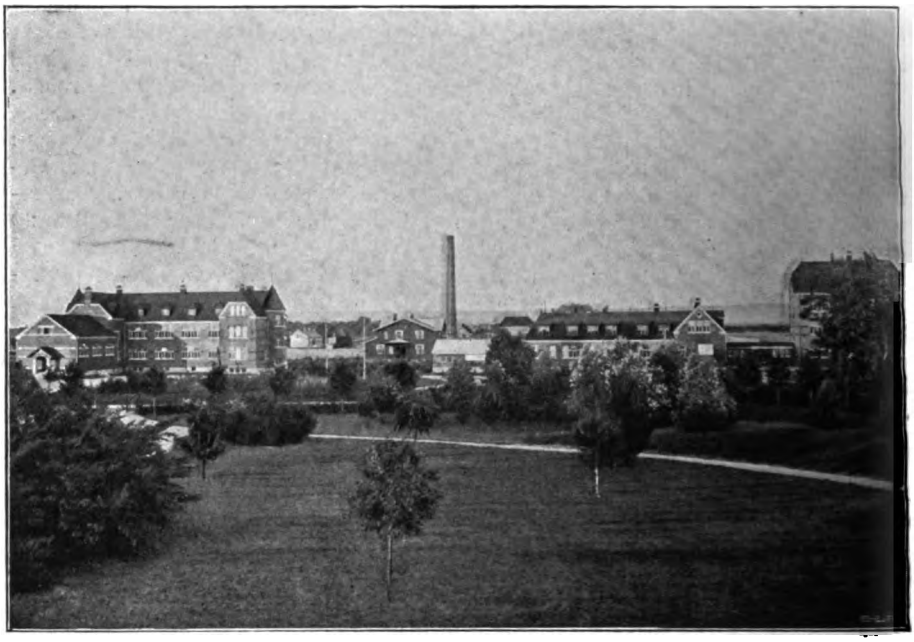

School for the Deaf and Dumb, Venersborg.

According to this law, the education of deaf mutes is a *public* concern within the purview of the County councils, nevertheless with important assistance from the State, which also exercises a certain superintendence over it. This instruction moreover, is *obligatory*. The school age is from 7, and continues for 8 years from the time the pupil first enters the school. Private instruction is subjected to the control of the Public school Boards.

For the official education of deaf-mutes Sweden is divided into *7 districts*, each with its Board, and one school at the least. Every district determines its own detail arrangements, which admits of multifarious developments in mutual competition, productive of excellent result. The need of greater unity, however, has been felt in certain practical questions, and to meet this need, plans have been prepared by delegates from the various boards, especially touching the teaching-staff, their salaries, and pensions.

At every school there is a trial class of one year, where the children are examined as to whether they can be advanced to the *articulation-method* division, which is the main feature of the school, and implies that the pupil learns to speak, and also to read the spoken language from the lips of others. Those who cannot are placed in the class for *writing-methods*, which teaches the finger-alphabet and writing, or in that for the *method of signs*, which embraces gestures, supplemented, to a greater or less extent, by writing and the finger-alphabet. But even children who are taught according to the articulation-method are divided into groups according to their ability of following instruction — a regulation which constitutes one of the cornerstones of the Swedish organization of teaching deaf-mutes.

The Swedish deaf and dumb schools are establishments on a large scale (counting, as a rule, a hundred pupils or more) with newly erected, expensive buildings (to a total value of more than 2 million kronor), and excellent educational appliances.

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New-comers to a School for Deaf and Dumb.

In four districts, the school consists of a single building; in one district, each of the three divisions of the school has its separate building, and, finally, two districts have located their different divisions in different towns. In five districts, the whole school has the features of a boarding-school, i. e. the pupils enjoy both board and lodging in the school itself; in one district, the school is partly a day-, and partly a boarding-school; and in one, it is exclusively a day-school.

The instruction is joint for boys and girls (a feature peculiar to the Scandinavian, German, and English American Deaf and Dumb school) and it is carried on during 40 weeks in the year, and comprises the usual Common school subjects. The boys are in addition taught sloyd, tailoring, and shoemaking; the girls, sewing, weaving, and household management, and, in one school, even cookery. Some schools teach both boys and girls gardening.

Pupils that have left the school may, as far as possible, revisit the school for a week or so every year; and at one school, attempts have been made to start a continuation course for such visitors, which has succeeded well, and been gratefully attended by the deaf-mutes.

Only two of the former *private* schools now exist, one of which takes deaf and dumb *idiots* that are capable of some instruction. The total number of *pupils* in the public and private schools amounted in 1902 to 803, 610 of whom were taught according to the articulation-method, 142 according to the writing-, and 49 according to the signing-method. The number of classes is 112 and of *teachers* 111, 51 of whom are men, and 60 women. There is a *Seminary* for training such teachers at the Manilla School in Stockholm (Borg's old Institute, but now a district school).

There are, besides, for deaf-mutes who are *over age*, two establishments with a total of about 60 pupils. These establishments gradually become unnecessary, in proportion as compulsory instruction is enforced.

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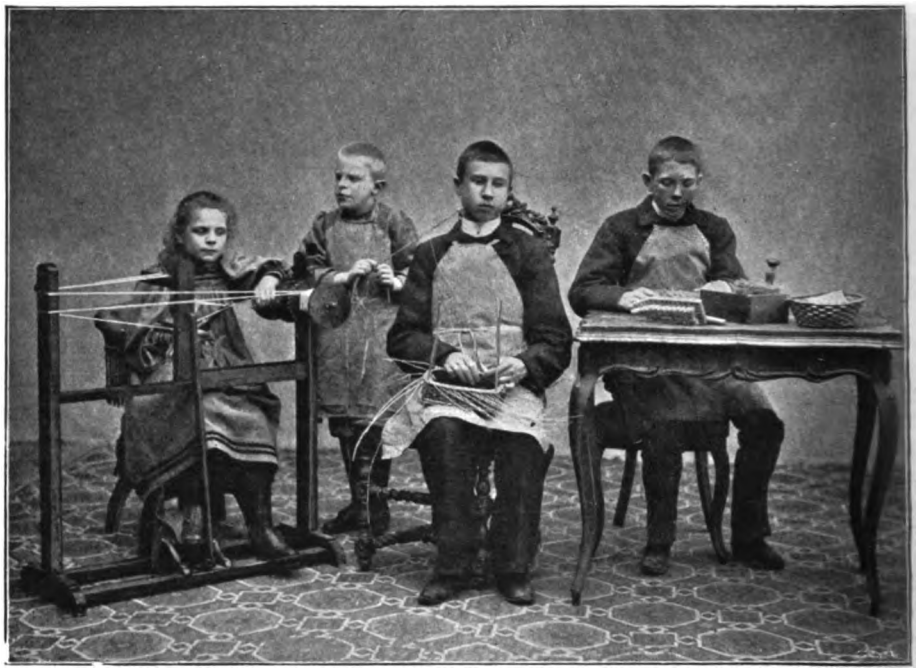
The cost of the instruction and support of deaf-mutes amounted in 1898 to about 550,000 kronor. The State makes a grant of 250 kronor for every pupil, and the County councils defray the rest. According to law, parents or guardians (or Poor Law authorities) may be made to pay a yearly fee (50 to 100 kronor) for each pupil; but some authorities have not availed themselves of this right.

In 1877, a *Swedish Deaf and Dumb Society*, one of the oldest of its kind in Europe, was formed by the teachers at these schools. The Society has, since 1880, published a magazine of its own, which in 1898 came to be the common organ of the deaf and dumb schools of Scandinavia. The deaf-mutes themselves have sometimes, after leaving school, formed societies for mutual help and recreation, of which the Stockholm society has considerable funds at its disposal.



Blind deaf-mutes at the School of Venersborg.

The total number of deaf-mutes in Sweden, according to the census of 1890, amounted to 5,307, or 110·9 to every 100,000 inhabitants — on the whole an uncommonly large figure. Of late, there has even been some inconsiderable increase.

There is a little school at Venersborg for **blind deaf-mutes.** It is the only one of its kind in the world. The institution was opened in 1886 by Mrs. E. Anrep-Nordin, who continues the direction of the school. The number of pupils since the commencement amounts to 28, while the number is still 14, of which total, however, but 6 are blind deaf-mutes, the remainder being blind, with a complication of other bodily or mental defects, some being blind idiots. The method used in the teaching of these children is the »writing-method», as it is called, together with the employment of the finger-alphabet, and writing

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with raised letters. Two of the children have shown a high degree of intelligence, and have been benefited by the instruction in a marvelous way, nay, have even been taught to speak. The School-Home at present enjoys an annual government-grant of 5,000 kronor. The fee paid by the pupils is 400 kronor per year, half of which is usually provided by the respective County councils.

Schools for the Blind. The teaching of the blind in Sweden dates from 1807, when *Per Aron Borg* (cf. article above on Deaf and Dumb Schools) began teaching a blind woman adopted in his home. In 1808, Borg was enabled to open his afore-mentioned *institute* at Manilla in Stockholm, which from 1810 enjoyed State support. This, however, soon proved insufficient, and so the education of the blind ceased, and was not resumed till 1846, when a special department for the blind was started conjointly with the Deaf and Dumb Institute. This combination, however, proved a check in the instruction both of the blind and of the deaf and dumb, especially of the former, who were more and more forced into the background by the much greater department of deaf-mutes. At length, in 1879, the teaching of the blind was dissociated from Manilla, and entrusted to a special *Institute for the Blind.* Started at Stockholm, it was removed to its new building at Tomteboda, in the neighbourhood of the city, in 1888. But the institute alone could not take the 200 blind children of school-age (from 7 to 17). Two *preparatory schools* were required for their preliminary instruction. One of these was established at Vexjö in 1884, the other was united to the institute, and came into operation in 1899. The preparatory schools are each capable of receiving 40 pupils, the institute at least 100. For those who have lost their sight at a more mature age there has been, since 1884, a *School of Arts and Crafts* in Kristinehamn, where the pupils receive gratuitous instruction in reading and writing, as well as in certain trades, such as brush- and basket-making, but must themselves defray the cost of their board. Each pupil, however, receives a contingent of the government subvention for this purpose.

By the law about institutions for the blind and a statute for them, both passed on May 29, 1896, the instruction of the blind became *obligatory* from the beginning of 1899. A child is received into the Preparatory school at the age of seven to be prepared, by a four years' course of instruction, for entering the institute, where its education will be continued and finished. Should such a child be of somewhat feeble intellect, it has to remain another two years in the preparatory school to finish off its studies. The subjects taught in this school are as follows: Religion, Exercises in object-lessons, Swedish, Writing, Arithmetic, Singing, Gymnastics, Hand-exercises, Modeling, and Needlework. Children who have satisfactorily passed the preliminary school are admitted into the institute, also children up to the age of 14 in the case of their having become blind after reaching the age of nine. For the former, the period of study is 6, for the latter, 8 years. The subjects studied at the institute are the same as those of the preliminary school with the addition of Geometry, Geography, History, Natural Science, Handicraft (basket-, brush- and ropemaking, joinery), Music, and Piano Tuning. The school-year, both at the preliminary schools and the institute, extends over 40 weeks. For every child at either establishment the County council pays 300 kronor per annum (a krona = 1·10 shill.), with the right of drawing contributions from parents or guardians or, from the parish. There is a course of training at the institute for those desirous of becoming teachers of the blind, and such students, while there, enjoy stipends from the Treasury. The institute receives an annual grant of 2,500 kronor to *print books for the blind.* Nearly all literature for the blind is now printed in Braille type. The annual expenditure of the State on the education of the blind at present amounts to about 95,000 kronor, exclusive of grants for buildings.

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This care of the State for the education of the blind does not exclude *private benevolence*, which aims chiefly at reaching those who have left school or have not had the opportunity of receiving any instruction in their childhood. For their benefit the following institutions are established, viz. the Working Home for the Blind, at Stockholm (since 1870), the School for Older Blind Girls, at Uppsala (since 1884), and the Home for the Aged Blind, near Stockholm (since 1888). In 1885, an *Association for the Welfare of the Blind* was formed with the principal object of promoting the employment of the blind by supplying them with suitable literature and working materials, and selling their work, etc. This association has established a shop in Stockholm for the latter object. The same object is aimed at by the *Association of the Blind*, organized by the blind themselves.

At the census of 1890, the *total number of the blind* amounted to 3,948, 1,992 of whom were above 60 years of age. The frequency of blindness (82·5 per 100,000 inhabitants) has on the whole diminished of late years, owing to improved medical treatment.

Schools for Idiots. Idiots were the last of the abnormal children for whose education provision was made in Sweden. The first school — a private one — was opened at Sköfde, in 1864. At the present time, there are 36 institutions (all homes); some of them schools (for children capable of instruction), others working homes (for pupils who have left school), and others again asylums (for those incapable of instruction). These institutions are supported by societies, County councils, and private people; moreover, the State grants 250 kronor for every teachable idiot in the schools, and 100 kronor for each pupil at the working homes (a krona = 1·10 shilling). The whole number in charge at the above institutions amounts to 889; *small* institutions of this kind being preferred, none of them contains more than about 80 pupils. The majority of such institutions are managed by women, and these do all the teaching, except in gymnastics and wood-carving, because women, owing to their gentler and more patient temperament, are considered best fitted for instructing idiots, which occupation tries these qualities.

The *Schools* are divided into as many as 8 classes, with a novitiate department of 2 years for judging of the children's capacity to receive instruction. The subjects of instruction are the same as at the common schools, viz. the Swedish Language, Religion, Swedish History, Swedish Geography, Natural Science, Writing, Arithmetic, Drawing, Singing, Gymnastics, and most kinds of Needle-work, Wood-carving, Basket- and Brush-manufacture, Shoe-making, Book-binding, and Gardening. It must be borne in mind that Sweden is the first country where *manual work* was employed as a means of education. This has been done, and very successfully too, even with regard to idiots, the majority of whom have shown much aptitude for practical learning — an excellent means of development in their education.

Working Homes were erected when it was found that pupils who had left the schools could not stand the humiliation of associating with workmen normally gifted. Working homes for *male* idiots are usually located in the country, and there the patients are employed with great success in agriculture and gardening. Under able superintendence they prove in a perfectly satisfactory way their ability to perform the rougher labours of farming and cattle tending. Homes for *female* idiots are generally located in towns; and the wards contribute towards their own support by weaving (in which art many attain a considerable skill), knitting, sewing, and lace-making etc.

There is an *Asylum* on a small scale attached to nearly every school. Up to the present time though, very little has been done in Sweden for this department of idiot management.

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For providing an efficient staff of teachers for idiots, a *Seminary* has been organized in Stockholm since 1878 at the School for Feeble-minded Children, with accommodation at the present time for 8 pupils, who undergo a two years' theoretical and practical course of training. The seminary is supported by the State at an annual cost of 12,000 kronor.

The *total number of idiots* in Sweden, according to the census of 1890, amounted to 7,619, or 159 per each 100,000 of the population. Probably this figure is a trifle too high though. For times gone by, the reports show a much smaller proportion, but they may undervalue real conditions. — The number of idiots in the school-age is about 2,000.

Working Schools for Disabled People. The idea of establishing schools for disabled people arose in Sweden in 1884, as a result of the visit of a Swedish physician, Doctor Carlander of Gothenburg, to the Congress of Physicians at Copenhagen, in the aforesaid year. The Danish Association to the care of disabled and maimed people had then not only arranged an exhibition of the work of the pupils, but also gave the members of the Congress an opportunity to *see* the disabled people working. This school was the only one of its kind in the world, and was connected with a gratuitous clinique for disabled people.

In *Gothenburg*, there was organized, as early as March 3, 1885, an »Association for Assistance to Disabled People» with much the same plan and laws as its Danish prototype. Means were collected, and the school was opened on October 5, the same year. The number of pupils has, from the beginning of the school till the end of the year 1902, amounted to 195. Of these, 23 were entirely in want of one arm, 27 paralyzed in one arm in consequence of disease. The others had different bodily defects, which made it difficult for them to be engaged in any trade. The school makes a point of giving the disabled people a *professional* education. Instruction is given in joinery, turning, shoe-making, basket-making, brush-making, and wood-carving for the male pupils, linen-sewing and art needlework, lettering, weaving and stockinet-knitting for the female pupils. As soon as the work is salable, the pupil has hitherto received full wages; the school has only taken pay for the material and run the risk of the work not being sold. Destitute pupils are given free dinner at the school. Free baths are given and an opportunity is afforded to the most sickly to spend six weeks in the country in summer. The County council of Göteborg och Bohus Län since 1885, and the County councils of Elfsborg Län since 1895, have granted a limited number of disabled people from their respective districts $^2/_3$ of the cost for their instruction and care, providing that the community or some private person would pay the other $^1/_3$. After the instruction has been completed, the school procures, if possible, situations for the male pupils, and also the female pupils are helped to independent work. All are supplied with necessary tools (the seamstresses are given a sewing-machine). In 1890, an orthopedic clinique was established (with reception twice a week), where medical assistance and necessary bandages could be had gratis. — The capital of the school amounts at present to 223,422 kronor.

In *Karlskrona*, on the initiative of a private person, a little school for disabled people was opened in 1886. In 1887, the Association for Assistance to Disabled People in Skåne was organized, and a working-school was opened in *Helsingborg*. In 1890, a *Home*, intended to hold 40 pupils, was built, but this number has never as yet been received, owing to the lack of sufficient means. In 1891, the »Society in Aid of the Deformed and Infirm» was established in *Stockholm*. In 1892, its working-school was opened; now also a »home» for part of the pupils is connected with the same. The pupils who need orthopedic treatment receive it at the general orthopedic clinique of Stockholm.

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The Helsingborg and Stockholm schools for disabled people have much the same by-laws and the same instruction, and work on the same plan as the Gothenburg school, of which we have given a detailed account above. Nothing has yet been done on the part of the State to facilitate the instruction and care of disabled people, so it is almost entirely from the neighbourhood in the immediate vicinity of the schools that pupils can be received.

Education for ill-principled and neglected children. For *criminal minors* from all parts of the Kingdom an agricultural colony is started at *Hall* in the län of Stockholm, organized on the model of the famous French institution of Mettray. The establishment enjoys a State grant, amounting to 50 öre (6 1/2 d.) per day and »pupil». Pupils are received at the colony from the age of ten to fifteen and, if found necessary, they can be retained there till they have reached twenty. At present, 175 pupils can be admitted. Of those received, 80 % are considered to have returned to society as members abiding by the law. By the city of Stockholm an educational establishment has been founded at *Skrubba* for children who — without yet having been prosecuted — show an evil disposition. Larger and smaller reformatory schools also exist in various other places.

With respect to a general organization of the educational work among ill-principled and neglected children, a law was issued June 13, 1902. According to this law, criminal or ill-principled children under fifteen years of age should be taken care of by educational authorities, not by a court of justice. As for culprits in the age 15/18 — in case the imprisonment to which they be sentenced does not exceed six months' time — the court has a right to convert this punishment into reception at a public reformatory establishment. Besides, the law prescribes that in every school district (at present about 2,500 in the whole kingdom) there shall be a Board to take charge of the ill-principled and neglected children of the district. This Board can be elected specially for the purpose, otherwise it may consist of the School board. A requisite number of *protective homes* shall be erected by the County councils, with support also from the State.

People's High Schools. Workmen's Institutes. University Extension.

During the last decades numerous efforts have been made in Sweden for the promotion of knowledge also among the adult population of the lower classes of the community, or among others who either through their trade or profession are prevented from attending the regular schools. These efforts have taken form, partly in the so-called »People's High Schools» and in the kindred »Workmen's Institutes», both of which institutions have originated on Scandinavian or Swedish ground, and partly in the so-called »University extension» movement, according to a pattern received from England. To this has, of late years, been added a great activity in popular public lecturing, which is being embraced with a steadily growing interest, and is arranged for by associations specially formed for the purpose.

People's High Schools (Folkhögskolor) are institutions which only exist in the three kingdoms of Scandinavia and also in Finland. Their purpose is to furnish *adult* members, especially of the peasantry, with an education at once civil, patriotic, and practical.

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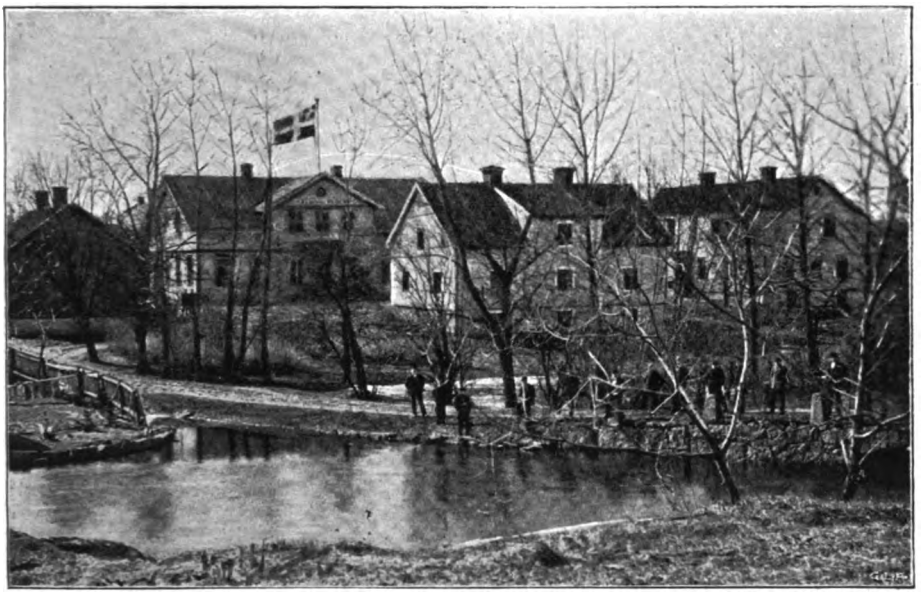
The establishment of these schools originated in Denmark, and was owing to the political danger to which that country was exposed in the middle of the nineteenth century in consequence of its conflicts with Germany — a danger which led to the adoption of all possible means of raising the general standard of the country's civilization. The People's High Schools were introduced into Sweden subsequently to the resuscitation of municipal selfgovernment, in 1862, and the Parliament Reform of 1865, which had the effect of considerably increasing the political influence of the lower classes, and consequently awakening the desire of a higher training of these classes for their duties as citizens.



People's High School. Lunnevad, Östergötland.

The first People's High School in Sweden was opened in 1868, at Hvilan in Skåne, it is still kept up and can in many respects be considered the parent school of the rest. Since the opening of this school, Dr. L. Holmström has been the leader of it.

Now there are 30 such schools, or at least one in every Län (in the Län of Vesterbotten only in preparation though). Skåne, our southernmost province, has the greatest number of them.

People's High Schools are all located *in the country*. Most of them now have buildings of their own, with residences for the teachers and a certain number of pupils, the rest of the pupils living in adjacent houses. Gymnastic halls are provided in some schools, and are also used by the people of the neighbourhood for meetings.

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Most of the schools were originally private enterprises, but nearly always supported by grants from the County councils and Agricultural societies, as well as the State. A Board of directors is appointed by the authorities and societies contributing, but considerable power is vested in the *manager*, on whose personal ability the success of the scheme is mainly dependent. No special courses of instruction are fixed, and there is no examination on leaving.

The manager is generally a man of University education; the other *teachers* (one to four at every school) are candidates of philosophy, engineers, agriculturists, or officers. Youths of eighteen — the average age is from 20 to 22 — having passed through the national school and bringing a certificate of good conduct are received as *pupils*. There is no entrance examination. The total number of male pupils during 1868/1900 amounted to 17,031; during 1868/98 the yearly number at each school averaged 27. In 1900, the total was 774 likewise equaling 27 at each school.

The instruction given covers a period of one or two years, the first and second of which, however, greatly differ in character, so that the majority of students only go through the first course. The teaching is chiefly imparted by simple lectures varied by questions, reading and explanation of the textbook, demonstration and explaining of the subject-matter by means of object lessons, written tasks, faithful representations of communal assemblies, executive committees, etc. According to the average of certain larger and older-established schools, the following subjects were studied as *a First Year's course* during the session from November 1897 to April 1898, viz.: Swedish language 186 hours, History 80, Geography 57, Politics and Municipal Law 56, Rural Economy 22, Natural Science and Hygiene 120, Arithmetic 85, Geometry, Land Surveying and Leveling 45, Book-keeping 47, Architectural Drawing and Drawing Tools 68, Writing 46, Singing 46, and Gymnastics 69 hours, to which may be added Reading aloud literary works, Discussions, Assemblies, and, in some schools, Sloyd.

The Second Year's course, which has more of a professional stamp, embraces, in addition, farming, rearing of domestic animals, and forestry. At 12 schools, the second year's course is arranged on the lines of a thorough *School of Agriculture*, with a special State grant towards defraying the costs of instruction. For further details on this matter cf. the chapter on agricultural instruction.

The State has made *grants* to People's High Schools since 1872. The total amount was raised by the Riksdag of 1900 from 55,000 to 120,000 kronor. Since 1883, a yearly subvention of 15,000 kronor (from 1901 inclusive, raised to 25,000 kronor) has been granted to necessitous pupils. (A krona = 1·10 shilling or 0·268 dollar.)

At the present time, there are also People's High School courses for **women.** As mentioned before, the courses for men are held in the Winter session from November to April. It naturally occurred to the authorities to fix on the summer for women's classes. A beginning was made at the People's High School at Hvilan in 1873, and the plan has since been more and more generally adopted. As a rule, these courses are directed by the manager of the men's school and his wife, with the assistance of the necessary number of the other teachers and of specially appointed female teachers.

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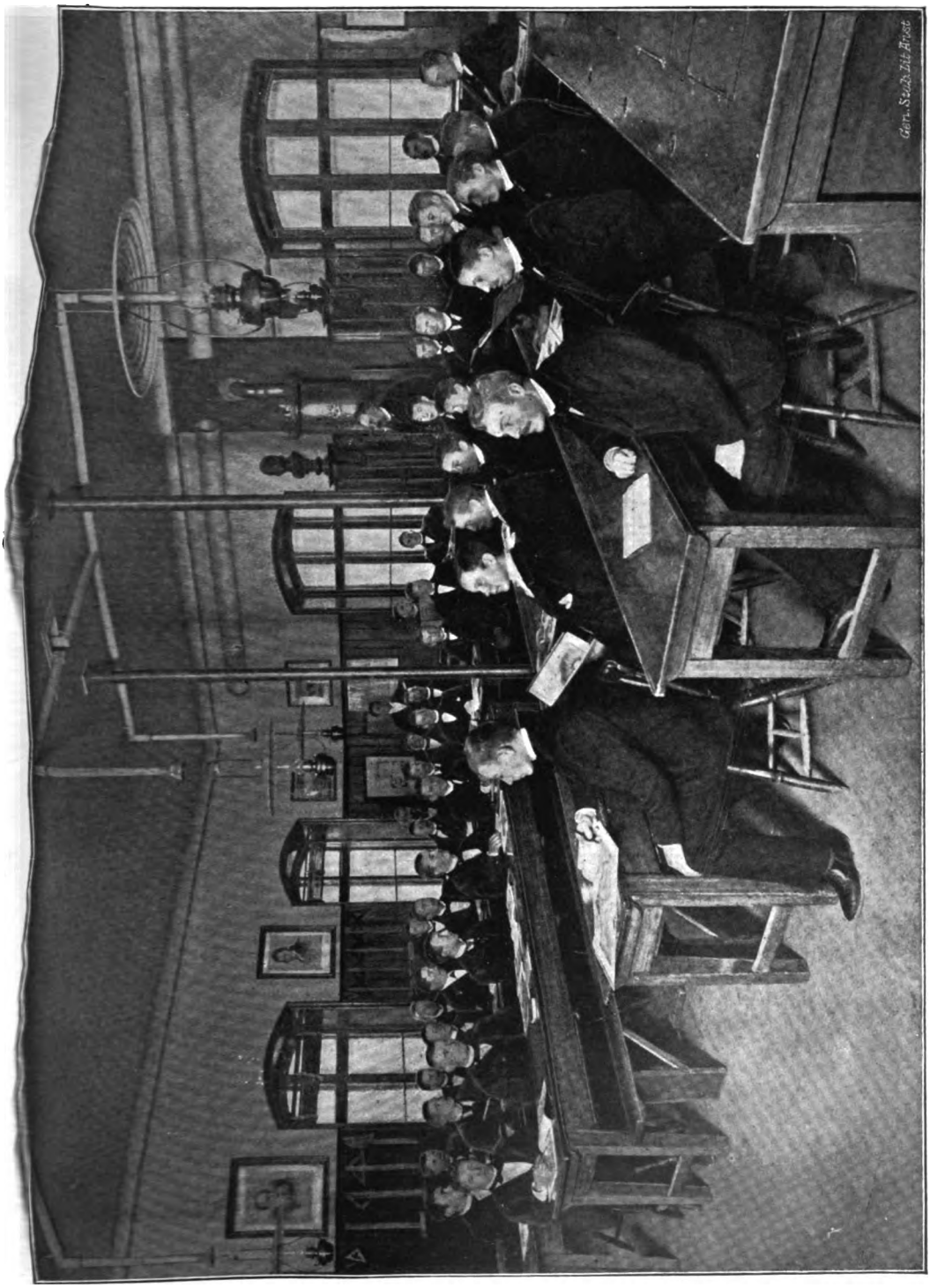

At the People's High School of Hvilan, Skåne.

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The total number of female scholars from 1873/1900 amounted to 6,778; during 1873/98, the mean average was 25 per annum at every school. In 1900, the total attendance was 614. The age is generally between 18 and 20. Instruction is given in the Swedish Language, History, Geography, Natural Science, Hygiene, and Domestic Economy, Arithmetic, Book-keeping, Writing, Singing, and several kinds of needlework and weaving. At two of the recently established People's High Schools in Norrland, the lectures for women are given in winter at the same time as for the men and are partly common to both sexes.

At most schools of this kind the pupils when leaving form a People's High School *alumni association*, which meets twice a year at their schools to hear lectures and discuss questions of general interest. Moreover, public lectures and national festivities are often held at the schools, and are largely attended by the people of the neighbourhood. Many of the teachers, too, are busied as lecturers in discussion clubs in different parts of the neighbourhood. So-called »*summer-courses*» have been started at many schools. These last from 8 to 14 days and are intended for students that have left, for common school teachers, as well as for others interested in such matters, and are carried on with the assistance of popular lecturers from the universities or other schools. The work of popularizing knowledge, brought about by the People's High Schools, is thus in many respects of very considerable importance.

Congenial with the People's High schools are the so-called **Workmen's Institutes**, located in the *towns* and offering to the working classes there popular lectures and opportunities for instructive reading. The first institute of the kind was established 1880 in Stockholm by A. Nyström, M. D. The lectures at it have chiefly pertained to history and natural science. After the pattern of the Stockholm institute, others of the same kind have been organized in several more Swedish towns as also in our neighbouring countries.

Of late years, an important and steadily increasing activity has been exercised in Sweden by a great quantity of **Lecture associations** of various kinds. The work has in some cases been entered upon by societies founded for other purposes, as working-men's associations, trade unions, temperance societies a. o.; but generally special associations have been founded for the purpose of arranging popular scientific lectures. In a marked degree, this movement has, of late years, been promoted by the establishing of *central offices* procuring lecturers; by means of these offices, a considerable unity and a better organization has been brought into the work. The oldest of these central offices is the one for Southern Sweden at *Lund* (since 1898), from which for the current year (1902) more than 900 lectures are ordered to be delivered by about 50 different lecturers at 75 various places. After the example of the central office at Lund, others of the same kind have been organized in *Stockholm* and *Gothenburg* as well as in *Uppsala* — the last mentioned only arranging for serial lectures.

The costs for these lectures were, to begin with, defrayed by the fees of the society members and by subventions from the respective communities and County councils, but nowadays to a considerable degree also by State grants. For 1902, Government has thus disbursed a total of 65,000 kronor to 123 different lecture institutions, but as petitions for subvention were sent in by no less than 56 other recent associations -- which, however, had to be refused on the strength of insufficient means at disposal — Government has presented a proposal to the Riksdag

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to increase the annual supply to 100,000 kronor, which also was granted. For State subventions to be granted, it is enjoined that the respective associations provide an equally great amount as the State, and that political and religious controversies or debates be excluded from the lectures. The interest in these lectures has been constantly rising, but of course it is as yet manifesting itself very differently in different parts. In the thinly populated country districts there are many difficulties to be overcome.

Another result of the same modern endeavour towards popular education are the so-called **Summer courses at the universities.** After the model of the English »University extension» movement, there has annually, since 1893, during the latter half of August, been given a course of lectures of a fortnight's duration, at Uppsala and Lund alternately, for people who are not able to profit regularly by academical instruction. The number of partakers has in Uppsala averaged nearly 400, of whom about two thirds were male and female common school teachers. The enterprise is embraced with great interest and receives support from the State as well as from communities and school Boards. In Uppsala, these courses are now managed by an official committee appointed by the university. — In 1902, such a »Summer course» was held also in Stockholm.

A quite original idea is the scheme, lately suggested in Sweden, of regularly arranged courses of lectures and instruction for the conscripts during the time that they acquit themselves of their service — the so-called **Army High school.** The class-work should be led by the officers, and as lecturers and teachers should act the officers and non-commissioned officers, conscripts of the educated classes, as also persons called in or specially appointed for the purpose. This thought — brought forward by T. Holmberg, manager of the People's High school at Tärna — arose in connection with the resolution of the Riksdag of 1901, stipulating an extension of the conscript service from three months to eight or twelve. The idea is highly attractive and involves grand possibilities for the future. The new conscription law, however, not yet having been fully carried into effect, the question of the »Army High school» is still at a stage of trial and preparation only.

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2. PUBLIC COLLEGES AND CORRESPONDING INSTITUTIONS.

Under this head will be considered the public colleges for boys, supported by the State, as well as the private schools of the same standing, and also the higher schools for girls, which in range of instruction closely approach the former.

Public Colleges.

The earliest schools of learning in Sweden, as in most other countries, were the *monastery schools* and the *cathedral schools* of the Middle Ages, and the *town schools* supported by the townspeople. As the monastery schools were closed at the advent of the Reformation, the present public schools of Sweden have gradually evolved from the cathedral- and town schools.

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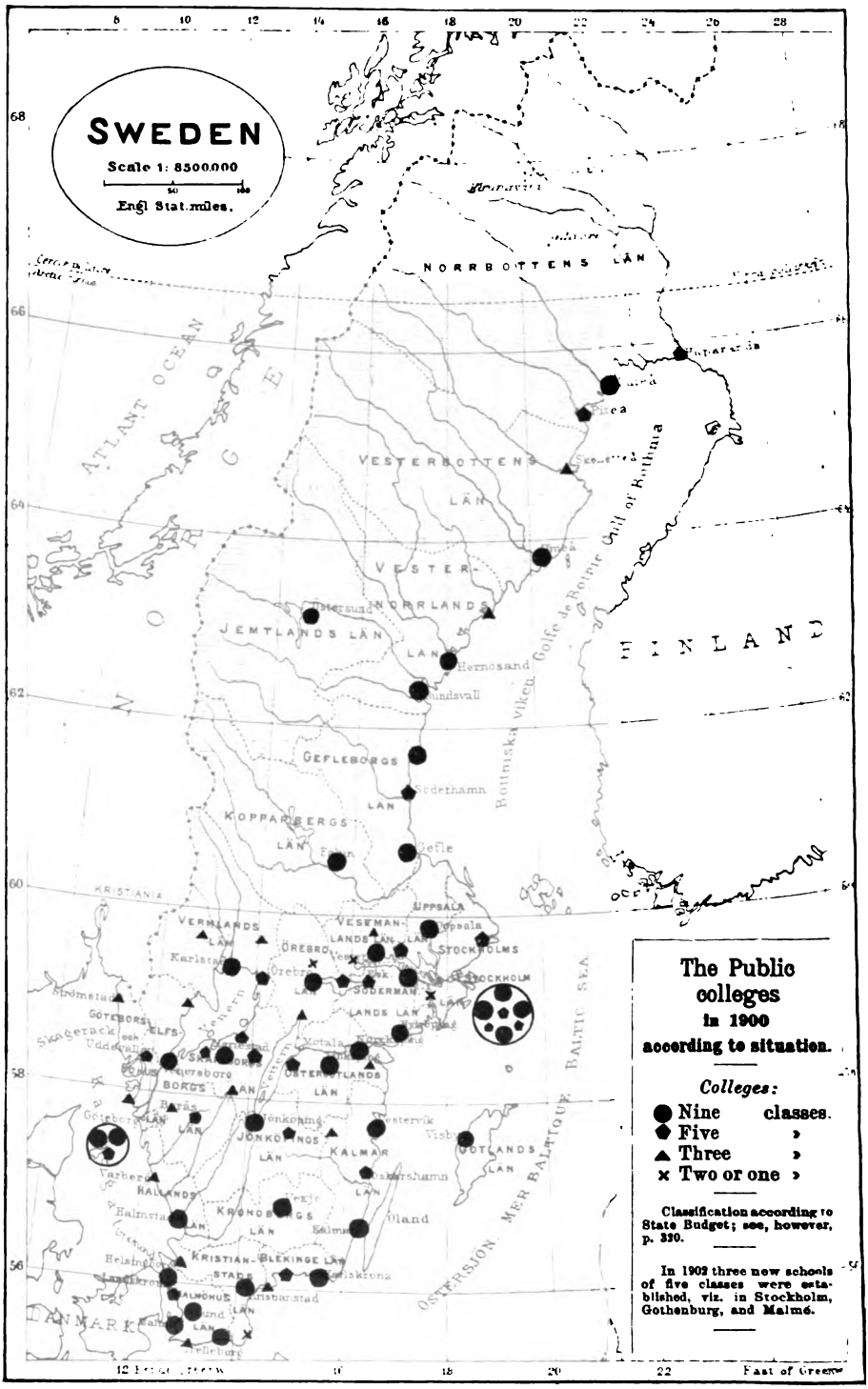

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It was in the time of Gustavus II Adolphus (1611/32) that the first higher schools of learning or »*gymnasiums*» were established; the oldest of them was founded in the year 1620 at Vesterås, by Johannes Rudbeckius. The first special School-Code was issued in 1649, partly through the influence of the famous Comenius, who had been summoned to Sweden. This code is usually looked upon as a pedagogical master-piece, but it was never fully put into practice. A distinction, however, was now expressly made between the lower and the higher school, the so-called »trivial school» and the »gymnasium», the former for children, the latter for young men. This distinction was in force during a couple of hundred years. The gymnasiums were almost exclusively institutions for the education of clergymen and civil officers. At the beginning of the 19th century, modern languages and natural science found a modest place in the curriculum, but it was not until after 1820 that there was any thought of a more thorough-going school reorganization.

During the years 1825/28, the *Great Education Committee* was at work. This committee consisted of the crown-prince as chairman and 26 members, among whom were several of the most eminent men of Sweden at that time, such as Tegnér, Geijer, Wallin, Agardh, and Berzelius. The notable report of this committee did not, indeed, lead to any other immediate action than the establishment of a State experimental school (Nya Elementarskolan, 1828); but the question of reform could never again be dropped, and the seventy years elapsed since then have been characterized by experimental reforms in various directions, though without any thoroughly satisfactory result. The »Apologist Schools» established at the side of the »Trivial Schools» to meet the demands for the common citizens' education, were soon abandoned, and, in 1849, the »Trivial» and» Apologist» Schools were merged, together with the Gymnasium, into one public college (»Elementarläroverket», or, as it was later called, Allmänna läroverket). Within the public college, Latin ceased to be an obligatory subject, and thus two parallel lines of study were gradually evolved: the Classical Line, with the classical languages; and the Scientific Line without these languages but with extended courses in mathematics, natural sciences, and drawing.

Among subsequent *partial reforms* may be mentioned the transfer of the university entrance examination from the universities to the public colleges (1862); the introduction of the probationary year for teachers (1865); the abolition of the lowest class; and the establishment of a semiclassical line with Latin, but not Greek (1869). Numerous educational committees (esp. in 1870/72, 1882/84, 1890/94) have prepared more or less sweeping reform plans, most of which, however, have remained without result. Yet Latin has been deferred to the fourth class (1873), and the Latin theme in the university entrance examination has been exchanged for a translation of Latin into Swedish (1895).

Since 1899, on the initiative of the Riksdag, an *Educational committee* is again at work, and public opinion seems ever more strongly to demand a definite solution of the reform problem. The fundamental thoughts accepted by the Riksdag are these: a renewed separation of the two stages of education that were represented by the school and the gymnasium; the promotion of the common citizen's education by a special course, with a final examination for students at the age of 15 or 16; the postponement of the study of Latin to the last four years; a broadening of the pupils choice of subjects in the higher classes; and a more complete appropriation of what is nationally and particularly Swedish.

Aim and number of the Public Colleges. According to the Public School Act of Nov. 1, 1878, still in force, it is the *object* of the public colleges to give a civic education beyond that imparted by the common schools, and also to impart that scientific knowledge which is to be further developed at the university or the higher technical schools.

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During the school year 1902—03, the entire number of public colleges as supported by the State amounted to 82. Of these, 35 had nine classes, 26 five classes, 17 three classes, 3 two classes, and 1 one class. Those containing nine classes are called *higher* or complete colleges; those containing five or three classes, *lower* colleges; and those containing less than three classes, *pedagogies*. But by municipal contributions and private donations, one lower school of five classes (Ystad) has been extended so as to comprise nine; and most of the other lower colleges have in a similar way been extended beyond their normal size as State schools, so that in reality, during the school year 1900—01, 36 colleges had nine classes, 1 six classes, 38 five classes, 1 four classes, 2 three classes, and 1 two classes.

Of the 36 colleges, 25 have both the lines complete; 7 only the classical line (3 having a scientific line in the sixth class); and 4 only the scientific line. All, with four exceptions, have both lines in the fourth and fifth classes.

The number of students in a section of the five lower classes must not exceed 40. But as parallel sections often occur in the same class, there are higher schools with 600 or 700 students, and lower schools with 300 or 400.

All the colleges are located in towns and cities. Their distribution is seen on the map, page 318.

Administration. The public colleges, like most of the educational institutions of the country, range under the Ecclesiastical Department. Within this department there is a special *Bureau for the higher educational affairs*, whose chief attends to school questions, and at times proceeds to inspect the schools.

Within each diocese the bishop is the *Superintendent* (Eforus) of its public schools; for colleges not located in the cathedral city, he appoints as his representative an *inspector*. The *Chapters* also possess certain authority over the colleges, having, for instance, to appoint their teachers. The public colleges in Stockholm are all under one *Board of directors*, which exercises over them the authority of the Eforus and the chapter. One of them, however, the Nya Elementarskolan (see above, p. 319), occupying also in other respects an exceptional position, has a special Board of directors.

At the head of every college there is a *principal* (rektor), who is appointed by the Government from among the applicants for a definite term of years — usually five — at the time. Beside his duties as head of the school, the rector has a certain amount of teaching to do, and is responsible for the school finances.

The rector is assisted in the performance of his duties by the *Faculty* (Lärarekollegiet), consisting of the teachers of the school, presided over by the »Eforus» or Inspector, if he is present, otherwise by the rector. The faculty determines upon questions of teaching,

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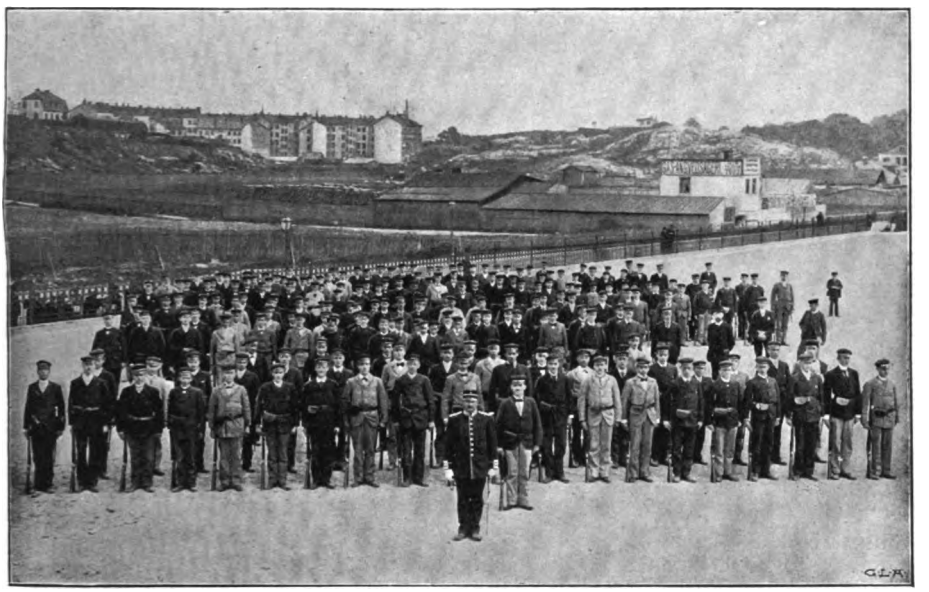
school discipline, finances, etc. In case the principal should not share the opinion of the teachers in any question under discussion, it is referred to the Eforus.

Instruction. The school year begins at the close of August and extends over 36 weeks, divided into *two terms:* the Fall Term and the Spring Term. The former lasts about 16 weeks; the latter about 20, with a week of Easter and half a week of Whitsuntide vacation. The actual number of *school weeks* is thus 34½. Hence the school-year is in Sweden considerably shorter than in other European countries. Thus it is in Denmark 43, in Prussia and Austria 42, in France 41, and in Norway 38½ weeks.



Pupils belonging to the Upper Classes in the Scientific College in Stockholm.

A complete school course is calculated for *nine years* of work, distributed over seven classes, of which the two highest (VI and VII) each covers two years. The first class is the lowest. The four highest classes are called respectively the lower sixth (VI : 1), the upper sixth (VI : 2), the lower seventh (VII : 1) and the upper seventh (VII : 2).

In classes I—III all the students have the same courses. With class IV the school branches into two lines: the *Classical Line* (Latinlinien) with Latin, and the *Scientific Line* (Reallinien) without that language. In classes IV and V, however, the difference in the curriculum of the two lines only touches a few subjects, inasmuch as the seven hours Latin and the one hour drawing on the classical line correspond to six hours English and two hours drawing on the other; the courses in history are, moreover, somewhat different, so that the

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TABLE 49. *Time-schedule for the Public colleges.*[1]

Subjects.	Lines.	I.	II.	III.	IV.	V.	VI: 1.	VI: 2.	VII: 1.	VII: 2.	Hours per week.
Religion	All.	3	3	3	2	2	2	2	2	2	21
Swedish	All.	5	5	6	4	3	2	2	2	2	31
History and Geogr.[2]	All.	4	5	6	4	4	3	3	3	3	35
Philosophy[3]	All.	—	—	—	—	—	—	—	1	1	2
Latin	C.	—	—	—	7	7	6	6	7	7	40
Greek	Ca.	—	—	—	—	—	6	6	6	6	24
German	Ca.	6	7	6	4	3	2	2	2	2	34
	Cb. S.	6	7	6	4	3	1	1	1	1	30
English	Cb.	—	—	—	—	—	3	3	2	2	10
	S.	—	—	—	6	6	3	3	3	3	24
French	Ca.	—	—	—	—	3	4	4	3	3	17
	Cb. S.	—	—	—	—	3	4	4	4	4	19
Mathematics	Ca.	4	5	5	5	4	3	3	3	3	35
	Cb.	4	5	5	5	4	4	4	5	5	41
	S.	4	5	5	5	4	6	6	7	7	49
Natural History[4]	Ca.	2	2	2	3	3	—	—	—	—	12
	Cb. S.	2	2	2	3	3	1	1	1	1	16
Physics	C.	—	—	—	—	—	1	1	2	2	6
	S.	—	—	—	—	—	2	2	3	3	10
Chemistry	S.	—	—	—	—	—	2	2	2	2	8
Penmanship	All.	2	2	1	—	—	—	—	—	—	5
Drawing	Ca.	1	1	1	1	1	—	—	—	—	5
	Cb.	1	1	1	1	1	2	2	1	1	11
	S.	1	1	1	2	2	3	3	2	2	17
Composition[5]	All.	—	—	—	—	—	3	3	—	—	6
Total	All.	27	30	30	30	30	32	32	31	31	278

two lines cannot be taught together in that subject. In class VI: 1 greater differences appear in the two curricula, and at the same time the classical line is subdivided into two sections: *section A* with Greek, and *section B* without Greek.

The same **Curriculum** (revised in 1895) is followed at all the colleges, except the afore mentioned State experimental school (Nya Elementarskolan) in Stockholm where certain deviations occur.

The teaching extends over 5 to 6 hours daily. Instruction in Singing, Drilling and Gymnastics, Military drill (obligatory), and also instruction in English (voluntary) for students in the A-section of the two highest classes, and in Drawing and Instrumental Music for boys who desire to learn them, takes place at times outside the regular curriculum, often in the afternoons. Instruction in *Singing* — obligatory to all students with ear and taste for music, in the lower five classes, but optional in the higher classes — must not occupy over two hours a week. *Gymnastics* is taught in all classes half an hour every day, or, if this is not feasible, at least in such a way that not less than three hours of instruction is given to every division in gymnastics. Sometimes pedagogical

[1] Roman numbers denote classes. Ca = Classical line A (with Greek); Cb = Classical line B (without Greek); S = Scientific line (the Classical and Scientific lines do not diverge till in the 4th class; and the division of the Classical line takes place in class VI: 1). — [2] Special hours are given to Geography in classes I—IV, resp. 2, 2, 3, 1, and 1. — [3] Psychology and Logic. — [4] Zoology (I—IV); Botany (II—V); Physics, Astronomy (IV); Chemistry, Geology (V). — [5] Swedish Composition in the class.

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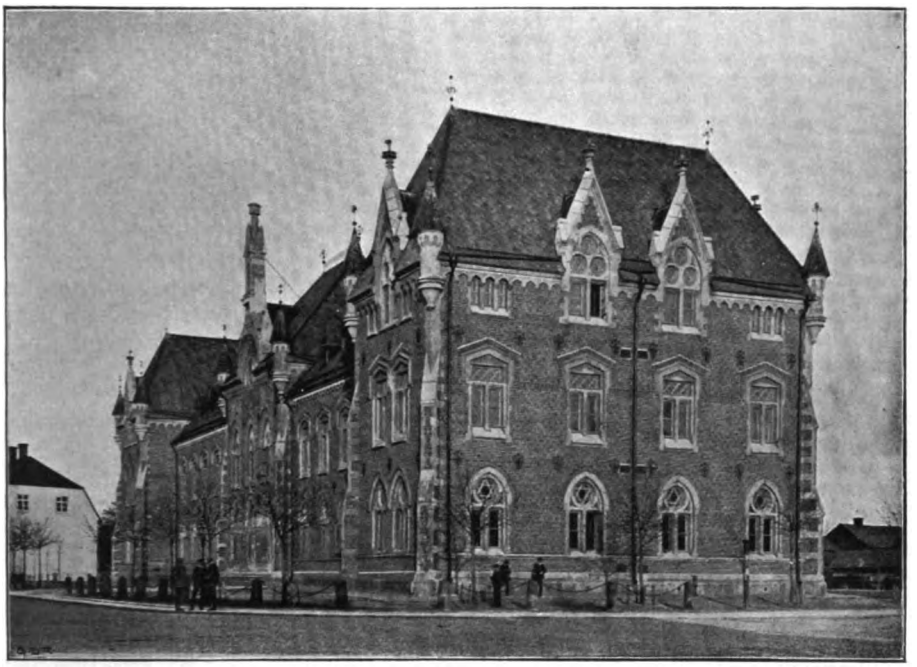
gymnastics are replaced by running *games* conducted under the teacher's supervision and guidance, preferably in the open air. *Military drill*, replacing gymnastics, for the boys in classes VI and VII, extend over five weeks at most at the beginning of the Fall term, for altogether 60 hours; during this period the rector may arrange with the teachers for a diminution in the number of school hours for those classes to the extent of from 7 to 12 hours a week.



The Public College in Skara.

In later years, *obligatory vacation tasks* have been assigned to the students during summer vacations. The subject and extent of these tasks, which are the same for all pupils in the same class, are determined upon by the rector towards the close of the Spring term, in accordance with the suggestions of the various teachers of the subjects concerned, in the main according to a settled scheme (1895).

New pupils are only entered at the beginning of a term, the great majority in the Fall, i. e. at the beginning of the school year. All who apply for entrance must be at least nine years of age; and they must all pass a special examination, unless they only change schools, and present satisfactory certificates. The *requirements for entrance* into the first (i. e. lowest) class have been established by law, and were modified to some extent (1894) in order to make it easier to pass from the common schools to the public colleges.

At the close of every Spring term a *general promotion* to higher classes takes place throughout the school. All students considered worthy of it are moved up without special examination to the next class. The others may, if they wish, present themselves for examination at the beginning of the Fall term, being then moved up if that examination results satisfactorily; this category usually embraces some 20 % of those who are promoted. A boy who has spent two years in a class without promotion is, as a rule, excluded from the school.

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TABLE 50. *Number of students in the public Colleges.*

Average for Fall-terms.	Whole number.		Classes I—III.	Cl. IV and V.		Cl. VI: 1—VII: 2.			Cl. IV—VII: 2.	
	Total.	Per 10,000 inh.		Class. line.	Scientif. line.	Class. line A.	Class. line B.	Scientif. line.	Class. line.	Scientif. line.
In 1875..	12,717	29·1	6,844	1,928	1,356	1,303	893	393	4,124	1,749
1876/80..	14,376	31·9	7,393	2,159	1,593	1,307	1,183	741	4,649	2,334
1881/85..	14,986	32·5	7,094	2,364	1,626	1,263	1,848	791	5,475	2,417
1886/90..	14,507	30·6	7,116	1,897	1,874	910	1,843	867	4,650	2,741
1891/95..	14,914	30·9	7,340	1,700	2,467	701	1,523	1,183	3,924	3,650
1896/00..	16,578	32·9	7,818	1,619	2,921	825	1,561	1,834	4,005	4,755
In 1900..	17,479	34·2	8,141	1,514	3,242	784	1,668	2,130	3,966	5,372

Every year, some time between April 15 and June 21, an examination of students reporting themselves for it is held at the various public colleges. This is the Final or **University Entrance Examination.** College students not presenting themselves for examination at the close of the Spring term or failing in it, as well as private outside students may be examined also at the close of the Fall term. The examination is conducted under the control and supervision of *Censors* temporally appointed by the Government, as a rule from among the University professors.

The examination is partly written, partly oral. The *written examination* takes place several weeks before the oral, and lasts from 4—6 days, the same at all schools. The papers are determined by the chief of the Ecclesiastical Department on the basis of suggestions made by the censors. The candidates who pass the written examination are entitled to enter also for the *oral.* The latter is conducted by the respective teachers in the presence of the censors, who, if they see fit, may themselves conduct the examination in part or entirely. As a rule, to gain the university entrance certificate, a student must pass satisfactorily in all subjects. Within certain limits, however, compensation is allowed.

This final college examination *is required* for entering not only the universities, but also various higher special schools such as the Military School, the Veterinary Institute, the Pharmaceutical Institute, and others. To enter the Technical High School this examination is not necessary, though it entitles to such entrance, provided it has been passed on the scientific line. So likewise the final college examination, without being required, yet entitles the student to enter the State railroad-, postal-, or telegraph service; and it is required for entering the custom service. An attempt is now being made to remedy the lack of a complete middle course with its final examination, for such students as would like to enter practical life before completing an entire College course (cf. p. 319).

The *annual examination* of the various classes at the close of the Spring term, to which the principal isssues a public invitation, together with his annual Report, is only to be considered as an exhibition before the public, a solemn completion of the work of the year, before summer vacation, and has no connection with the promotion of the students to higher classes on the ground of meritorious work, which has already been made previously.

Students. As seen in Table 50, it is only in recent years that a marked increase in the number of public college students is noticeable since 1880. A significant discrepancy between the various lines is clearly seen, the scientific line having gained in attendance, while the classical (especially the A-line, with Greek) has lost.

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TABLE 51. *Number of college-graduates to the universities.*

Average for the years	Total number.			Per 100,000 inhab.	From		Students in State Colleges belonging to			Matriculated at universities[2]	
	Men.	Women.	Total.		State Colleges.	Private Schools.[1]	Class. line A.	Class. line B.	Scientif. line.	Total.	In %.[3]
1871/75.....	612	2	614	14·86	557	57	.	.	65	430	70·0
1876/80.....	570	4	574	12·75	470	104	266	137	67	376	65·5
1881/85.....	773	11	784	17·02	665	119	268	263	134	509	64·9
1886/90.....	760	27	787	16·60	658	129	209	327	122	462	58·7
1891/95.....	665	27	692	14·33	575	117	145	285	145	350	50·6
1896/00	801	49	850	16·89	701	149	169	273	259	369	43·4

Of the total number of students entered at the public colleges, ordinarily only about 1/4 reach the final examination. During the quinquennial period 1893/97, the average yearly number of students leaving these schools without taking the university entrance examinations was 1,883. Of these, 531 entered commercial life or commercial schools; 225 engaged in industrial pursuits of various kinds; 214 entered private schools or engaged in private study; 137 entered technical schools; 109 agricultural schools, 85 schools of navigation, etc. Above 20 % gave no information regarding their future career, while of those that gave such information 83 % engaged in practical pursuits, or entered practical schools.

The number of students, having passed the university entrance examination is seen in Table 51. Also here no very marked increase is shown in later times, and the period 1881/85 presents the maximum. The number of students entering the universities has decreased both relatively and absolutely, as is also shown by Table 51. Thus were matriculated at the universities, during 1871/75, as many as 70 % of all that graduated, but during 1896/1900 only 43 per cent. This is owing to the ever growing demands of practical life.

Out of the 6,166 candidates (from the public colleges) who successfully passed the university entrance examination during the ten years 1886/95, 2,804 stated their intention of entering the universities. A total of 666 entered military schools, 557 technical, and 409 commercial schools or life. The mean age of students passing the university entrance examination from the public colleges between 1876/80 was 19·96 years. Gradually this age has decreased, so that during 1891/95 the average was only 19·26 years. The age af private students generally ranks somewhat higher.

Teachers. At the public colleges there are, apart from the principals, three categories of teachers with fixed appointments, viz.: a) *lectors* (in the higher schools only), who possess higher attainments, draw a higher salary than the others, and are required to teach chiefly in the upper classes; b) *adjuncts* (or »colleagues» in lower schools), who possess lower attainments, draw a lower salary than the lectors, and are

[1] Students from accredited private institutions (1896/00, average 87), and private students (average 62); of these 149 students, 21 belonged to the A-line, 72 to the B-line, and 56 to the Scientific line. — [2] The Caroline Institute and the private universities of Stockholm and Gothenburg inclusive. — [3] Percentage of the total number of graduates.

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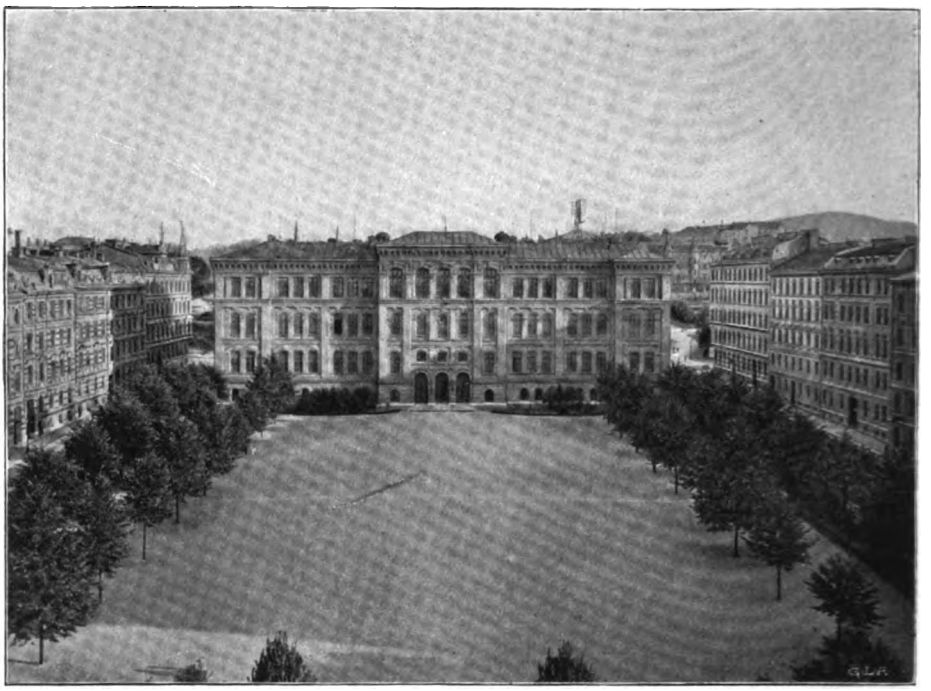
required to teach chiefly in the lower classes; c) *exercise-masters*, who give instruction in Drawing, Music, Gymnastics, and Military Drill. — The total number of teachers during the school-year 1899—1900 amounted to 1,022, viz.: 79 principals, 207 lectors, 529 adjuncts and colleagues, and 207 assistant masters. Thus there was one teacher for every seventeen pupils. Besides these teachers, there were 252 exercise-masters.



The Scientific College in Gothenburg.

The number of *teaching hours* a week required of a principal at a higher college is 12—16, of a principal at a lower school 20—24, of a lector 18—22, and of an adjunct or »colleague» 24—30. — In the lowest class instruction is given, as far as feasible, by a single teacher, in the next three higher classes likewise by one or two, or at most four. From the fifth class upward, the system of one teacher for each subject or group of subjects prevails.

The Qualifications for becoming teachers in the public colleges are as follows. As regards theoretical knowledge, lectors are required to have gained the doctor's degree in the philosophical faculty at a university. Adjuncts etc. only the »candidates» (master's) degree in the same faculty. As regards practical experience, both lectors and adjuncts must have passed a probationary year (Profår).

Courses for the *Probationary Year* are arranged at Stockholm, Uppsala, and Lund; it must be completed during two consecutive terms. The number of those who go through it annually is 50. The work embraces a theoretical course in the theory and history of pedagogics, and a practical course consisting in attending and performing instruction in the various classes of the college.

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The Appointment of Teachers is in the hands of the Chapters (in Stockholm in those of the two Boards of directors, see p. 320); against their decision complaint may be lodged with the Government. As is the case with the majority of Swedish officials, public school teachers with fixed appointments cannot be removed unless upon judicial trial and sentence.

The Salaries of the regular teachers are apportioned in five gradations. Five years of service entitles to promotion to a higher gradation from the next lower, and then the service as assistant teacher may also be taken into account from the time of completed competency. A *lector's* salary thus rises from 2,500 to 4,500 kronor, an *adjunct's* from 1,500 to 3,500 kronor (a krona = 1·10 shill.). Ever since the year 1883, the Riksdag has annually granted an increase of salary to the extent of 500 kronor, which must be added to the above figures. In some towns, where the cost of living is high, a special contribution towards rent is made by the local authorities. The *principals* receive at the higher colleges at first 4,500, and after ten years of service 5,000 kronor; at the five-year schools 3,500, and after ten years 4,000 kronor; and at the three-year schools 3,000, and after fifteen years 3,500 kronor. In addition, they are provided with a house, or with the rent for a house, and enjoy the above-mentioned increase of 500 kronor. The salary of the *exercise masters* is paid at the higher colleges in three gradations, and at the lower, where the hours of required service are much fewer, with a fixed amount varying for various schools. — When a teacher has attained an age which added to his years of service makes up the number 100, he obtains a *pension*, 80 % of his salary. Widows and children receive considerable sums in pensions out of a fund to which fixed contributions are annually made by the teachers.

Ever since 1882, the teacherships at the schools of three and fewer years have been filled by men appointed temporarily; in consequence of this and of the great irregularity of increase in the numbers of students at different colleges, the number of teachers on the permanent staff is at the present time below what it should be, and has to be augmented by *assistant teachers*. The number of these amounted to no less than 207 in the year 1899—1900. The average age at which adjuncts obtain their ordinary appointments has risen to almost 40. As a temporary relief, while the question of reform is pending, the Riksdag of 1901, has granted means for the appointment of 80 new regular teachers, viz. 15 lectors and 65 adjuncts.

During the school-year 1899—1900, 27 positions (in drawing and music) in the public colleges were occupied by *women*.

Finances. Every town where a public college is situated is bound to provide, free of cost, a *site for the school-house*, extensive enough to provide space for the games and open-air exercises of the boys. In certain cases the towns are also under obligation to build and keep the *school-house* in repair; in other cases again, this duty falls upon the building-funds of the colleges and of the diocese. Where these have not proved sufficient, the Riksdag has occasionally made a special grant to meet the wants. — The Swedish school-buildings may, in general, be said to fulfil in a high measure the requirements of practical utility and elegant appearance.

The cost of some recent school-buildings (their fitting-up, but not their site inclusive) has amounted to the following figures; the Norrmalm Classical College at Stockholm 842,000 kronor; the Scientific College in Gothenburg 542,000 kronor; the College at Vexjö 317,000 kronor; the Scientific College in Stockholm 783,000 kronor, and so on. The value of all the public college buildings in the country was assessed for the year 1899 at 10·49 million kronor.

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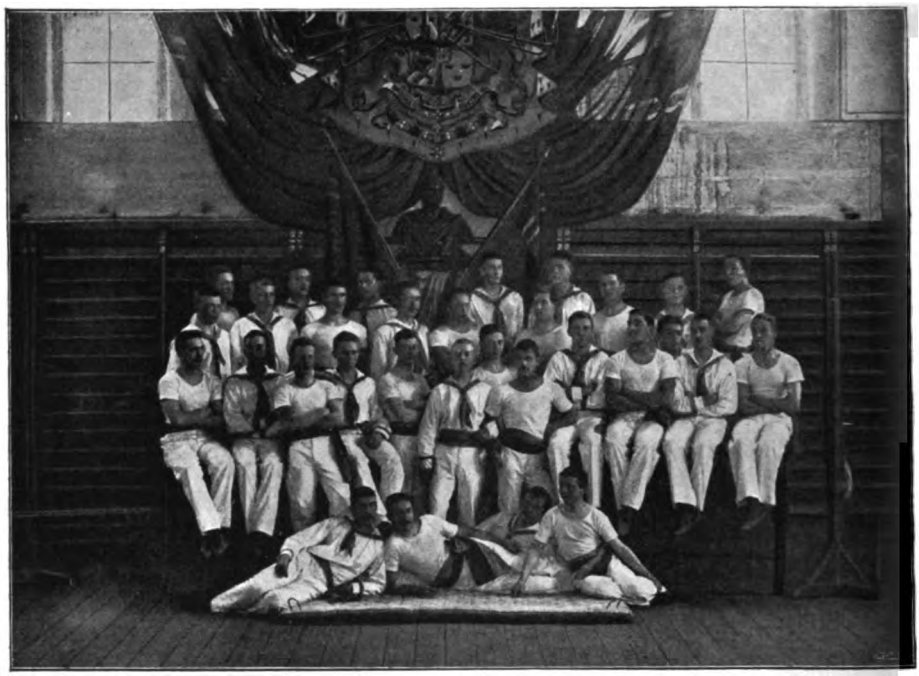
All students, except such as are unable to do so, or those transferred from other colleges, pay a *matriculation fee* of 10 kronor. They also pay a small *term fee*, from which, however, poor or promising boys may be exempted. The entire yearly amount paid to the school by each student, unless exempted, is 30 kronor. This income is used for the purchase of light, fuel, and school material, for prizes, and for the building reserve-fund. The great social import of the school fees being so insignificant has been spoken of already in the preceding (p. 144).



Members of Gymnastic Clubs at the Colleges in Stockholm and Uppsala.

Every diocese is required to keep a special *building-fund* as well as a *prize- and poor-fund*, for the needs of the public colleges located within its borders; the income derived annually from these funds is distributed among the schools in the diocese, in proportion to the number of students, etc. Their income is constituted by contributions from the State and the Communities, donations, etc. They are administered by the Chapters. — Some colleges, moreover, possess considerable *donation-funds*. During the period 1876/1900, the amount of such funds, devoted to scholarships, prizes, or students' assistance, *increased* by the sum of 1,122,952 kronor.

The State Expenditure for the public Colleges of Sweden amounted in 1900 to 3,824,628 kronor, or 0·75 kronor per inhabitant, and 222·69 kronor per student. With the contributions of the communities (for schoolhouses, aid to the teachers for their rent, etc.) and of the special school-funds, the total expenditure for public colleges probably amounts to about 4 3/4 million kronor (à 1·10 shilling or 0·268 dollar).

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Private Colleges for Boys. Mixed Schools.

In consequence of the small fees demanded in the public schools (p. 328), private enterprise in higher education has met with considerable difficulties, and the number of private colleges is still small. At present there are only 5 private schools for boys entitled to furnish university entrance certificates, viz.: two in Stockholm (the Beskow School and the Palmgren coeducational school), two in Uppsala (a boarding-school for future clergymen, the Fjellstedt School, and the Uppsala Private College, for both sexes), and one in Lund (the Lund Private College). The main income of these schools, as well as of various smaller institutions with fewer classes, consists of the students' fees. Yet some of them also receive state grants. Such grants amounted for 1900 to 35,000 kronor.

Aside from the above-named coeducational institutions, which are complete colleges, there are some twenty other coeducational schools where the instruction is about the same as in the public five-class colleges. Of these there are three in Stockholm. The others are found, for the most part, in minor towns or places of greater industrial activity, more important railroad centra, etc. The mixed schools of Motala and Hedemora may hold final examinations entitling the boys to enter class VI: 1 of the public colleges; the mixed school of Falkenberg may likewise examine for class IV.

Collegiate Schools for Girls.

Collegiate schools for girls are of recent date in Sweden. With the exception of the Wallin School (Wallinska skolan) in Stockholm and the Kjellberg School (Kjellbergska skolan) in Gothenburg, which were founded during the thirties, they all came into existence during the latter half of the 19th century. Before that time, girls were taught at home by governesses, or sent to boardingschools. Nothing, however, having been done for the training of lady-teachers, the instruction imparted was often very defective. When this condition became more clearly understood, the *Higher Seminary for Lady-Teachers* was established at Stockholm in 1861, for the purpose of training teachers both for the school and the family, and in 1864 was opened the *State Normal School for Girls*, which is connected with the training college and forms a practising school for its students. With the exception of these two establishments, all the higher schools for girls in Sweden are private institutions.

A) **The Higher Seminary for Lady-Teachers** and the **State Normal School for Girls** are governed by a *Board* nominated by the Government. This board appoints a *head-master* and *two assistant-head-mistresses*, one for each of the two institutions.

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The board also appoints *teachers*, of whom the regular men-teachers, with regard to qualifications and salaries, correspond to the masters of the state collegiate schools for boys. The salaries of the lady-teachers are about the same as those of the assistant masters of the above mentioned collegiate schools. The annual grant to the Higher Seminary and the Normal School is at present 49,500 kronor.[1]

The Higher Seminary for Lady-Teachers comprises three one-year classes, in addition to which there is an optional fourth year's course. The number of students in each of the obligatory classes is generally 25. In order to obtain admission to the Seminary, the applicant must have completed the age of 18 and have passed an examination testifying that she has attained the standard of knowledge which corresponds to a complete course at an eight years' collegiate school for girls (vide below). Of the entire number of hours given in the obligatory classes about 32 % are devoted to the French, German, and English languages; 24 % to religious instruction, the Swedish language, history and geography; 23 % to mathematics, natural science, and hygiene, 8 % to pedagogics and the method of teaching, and 13 % to singing, drawing, and gymnastics. Some of the subjects are, however, optional. — The *fourth course* of the Seminary is intended particularly for the training of specialist teachers. Each student, therefore, receives instruction only in those subjects which she herself chooses. — All instruction at the Seminary is free of charge, and poor and deserving pupils receive small scholarships from the State.

The Normal School comprises 3 preparatory classes for children of 6 to 8 years of age, 8 regular classes, and a continuation class, the last chiefly intended for instruction in domestic economy. The pupils of the school pay annual fees ranging from 75 kronor in the lowest class to 185 kronor in the highest. In the continuation class the fee is 100 kronor.[1] Fifteen pupils are, however, educated free of charge, and five pay but half the fees. Of the entire number of lesson hours in the eight regular school-classes 24 % are devoted to the French, German, and English languages; 33 % to religious instruction, the Swedish language, history and geography; 15 % to mathematics, natural science and hygiene, while no less than 28 % are allotted to writing, drawing, singing, needlework, and gymnastics. Some of the subjects are, however, optional.

In connection with these institutions a **School of Domestic Science** was opened in 1893, the pupils being not only those of the continuation class of the Normal School, but also others who wish to qualify for becoming teachers of domestic economy in collegiate schools for girls. Pupils of the latter class, who must be at least 20 years of age and produce certificates proving that they have the necessary elementary knowledge, are instructed in a special course, both theoretical and practical. The theoretical course embraces physics, chemistry, the science of food, domestic economy, hygiene (including the physiology of digestion), bookkeeping, and pedagogics. The practical instruction, comprising cooking, baking, preserving, marketing, etc., and also scullery work, is designed not only to make the students thoroughly at home in these various occupations, but also to give them direction and practice in teaching these subjects themselves. The instruction is free of charge, but the student pays for the meals taken during the time she attends the school.

B) **Private Schools.** The entire number of these schools is about 120, having altogether about 13,000 pupils. Started by private persons or associations, or by communities, they have had perfect freedom to

[1] A Swedish krona = 1·10 shilling = 0·268 dollar.

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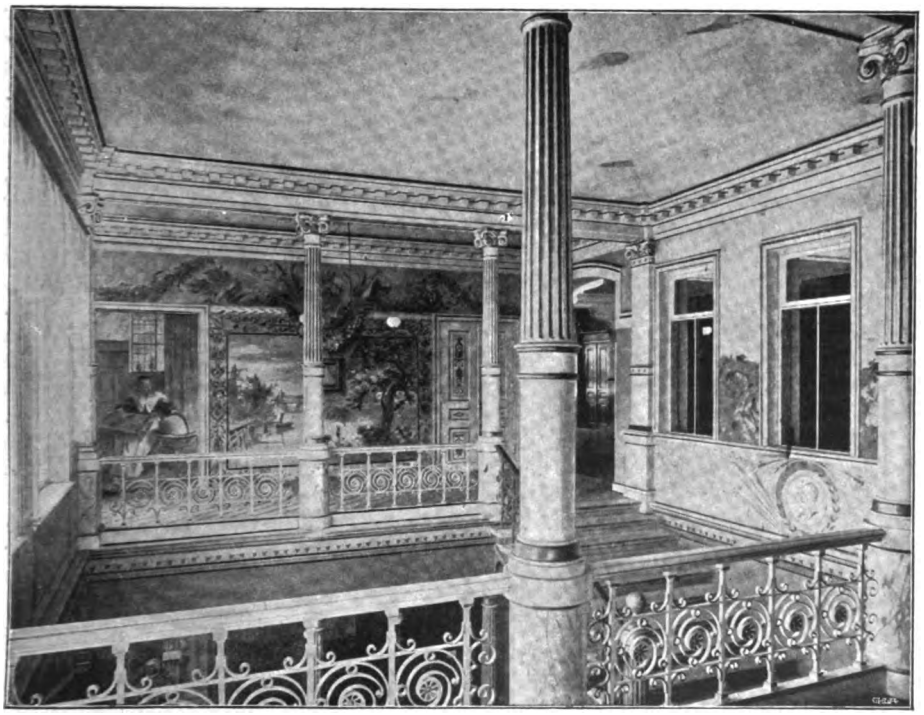
develop in various directions, but have, at the same time, suffered from a lack of guidance and control, and, moreover, often felt the stress of money difficulties. These disadvantages have not remained unnoticed. In 1875 the State made them a grant of 30,000 kronor, which grant afterwards became annual and at various times raised, until now it amounts to 347,500 kronor. The conditions for enjoying the advantages of this grant are mainly that a certain number of pupils be instructed free of cost or at reduced terms, that the school in question submit to the control of the Ecclesiastical Department, and that the community or private persons contribute a sum at least equal to the grant made by the State. This annual grant is not to exceed 3,000 kronor for each school, or for schools instructing in domestic economy at most 3,500 kronor. At present 103 schools enjoy such grants from the State, their combined number of pupils attending the regular classes being 10,694 (beside perhaps 3,000 in the preparatory classes). The fees paid are very different, varying from 40 kronor to 150 kronor in the lowest classes and from 110 to 250 kronor in the highest, all per annum, the classes preparing for university entrance charging even more. In view of the virtually free instruction given to boys in the state collegiate schools, these fees must be considered very high.



New College for Girls, Gothenburg.
Staircase with Fresco Paintings by CARL LARSSON.

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Several of the private schools for girls have their own *schoolbuildings*, others are compelled to employ ordinary dwelling-houses, which, especially from a sanitary point of view, often leave much to be desired. *The length of the ordinary school-course* varies, but is generally 7 to 8 years. The number of schools with seven or with eight classes is about the same. Some few schools have only 5 or 6 classes. Almost all schools have 2 or 3 preparatory classes, in which, with but few exceptions, boys also are taught. About 20 schools have one or more continuation classes.

The subjects of instruction are chiefly the same as in the State Normal School for Girls, one or more additional subjects being, however, introduced into some schools. Thus, in a few, manual work comprises not only ordinary needle-work, but also wood-sloyd and cardboard-sloyd. A few schools give instruction in the history of art to the highest class. Domestic economy is taught in 14 schools to one or another of the regular school-classes, generally only to the highest.

Very varying is the position given to the different subjects, especially as regards foreign languages. In most schools French is the fundamental language, in others German. During the last few years though, there seems to be a tendency to make the French and German languages change places, several schools having of late made German the fundamental language. English is usually the third language taught, though in some schools it ranks second. Other subjects too, for instance mathematics and natural science, are studied to a varying extent in different schools.

In most schools two of the foreign languages are optional, in some all three. Pupils can generally be exempted also from a few other subjects, as for instance geometry, singing, and drawing.

The continuation classes are formed for various purposes and therefore very differently arranged, some being intended to prepare for university entrance or for admission to the Higher Seminary for Lady-Teachers, others to train teachers, or to give the pupils greater insight into various subjects. *The university entrance examination* can be passed at 5 of the schools for girls (4 in Stockholm and 1 at Malmö). The right of passing this examination was given to women in 1870. At first only few availed themselves of this right, but during each of the last three years the number has been 50 or more.

In most of the schools there are both *men-* and *lady-teachers*. The men, who, with few exceptions, are teachers also in the state collegiate schools for boys, give comparatively few lessons, and are paid per hour. The salaries paid to lady-teachers are, as a rule, very low, especially considering the demands made on them. On an average they do not exceed 1,000 kronor per annum; most head-mistresses get but 1,200 to 1,500 kronor, besides residence and fuel. A raising of the salaries has, however, in 1902 been decreed by the State as a condition for the receiving of State grants. — There are two *institutions for pensioning lady-teachers*. One, founded in 1855, is intended for such teachers in general and supported chiefly by contributions from the teachers themselves. The other, which was founded in 1886, exclusively for teachers in collegiate schools for girls levies contributions partly from the teachers, partly from the schools concerned. Small grants are also made by the State.

On the initiative of the Riksdag, the Government, in 1885, appointed a committee to examine to what degree the girls' schools needed and deserved further support. This committee, the first official committee on which women were also appointed, made a thorough investigation of the girls' schools, demanding detailed information from each of them and visiting a great number of them in different parts of the kingdom. The above-mentioned increase of the grant to the girls' schools may be considered as a result of the report of this committee. Yet, notwithstanding this increase, the economical conditions of these schools must still be considered as rather unsatisfactory.

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3. HIGHER EDUCATION.

Sweden has two State Universities, viz., in **Uppsala,** founded 1477 (the oldest in Scandinavia), and in **Lund,** founded 1668, chiefly with a view to promote a closer union of the provinces then newly acquired from Denmark with the rest of Sweden. Both universities are thus — as in England — located in country-towns. To make up for the lack of a State university in **Stockholm,** the capital, private munificence has there established a private university; the same thing has been done also in **Gothenburg,** the second city of Sweden. Besides this, there has existed in Stockholm, since 1815, a medical faculty, the **Caroline Institute,** founded and supported by the State.

In proportion to its population, Sweden is thus quite well supplied with higher scientific institutions. Beyond the borders of Sweden there exist two other universities, once founded by the Swedish government, viz., the *University of Helsingfors*, in Finland, founded in 1627 (originally in Åbo), and the *University of Dorpat* in Lifland, founded in 1632, the oldest university of Russia. Besides, the *University of Greifswald* in Pomerania was a Swedish institution from 1648 until 1815. In our days the Swedes in America have founded, aside from various theological seminaries, several higher collegiate institutions. The graduates of *Augustana College and Theological Seminary* at Rock Island, Illinois, *Bethany College* at Lindsborg, Kansas, and *Gustavus Adolphus College* at St. Peter, Minnesota, are privileged to enter the universities of Sweden. The Augustana College seems to be gradually developing into a real university.

The State Universities.

The universities established by the State are, as already mentioned, the two complete **Universities of Uppsala** and **Lund,** and the **Caroline Institute** in Stockholm, the last-named forming only a medical faculty, the greatest of its kind in the country. Like the other State Schools, these institutions also range under the Ecclesiastical Department.

According to statutes of January 10, 1877 (with some amendments of 1891), the highest superintendence of the Universities and the Caroline Institute is exercised by a **Chancellor** appointed by the Government on nomination by electors from the three institutions. The chancellor watches over the observance of the statutes, issues instructions respecting the administration of the finances and estates of the universities, and recommends finally and officially in questions of appointments and, on the whole, in all such measures concerning the universities as are submitted to the decision of the Government. He does not receive any salary but is entitled to appoint a salaried *chancellor's secretary* for his office. The representative of the chancellor and, in certain cases, an intermediate authority between him and the local academical authorities is the *vice-chancellor*, whose office is filled at the University of Uppsala by the Archbishop, and at the University of Lund by the Bishop of the diocese of Lund.

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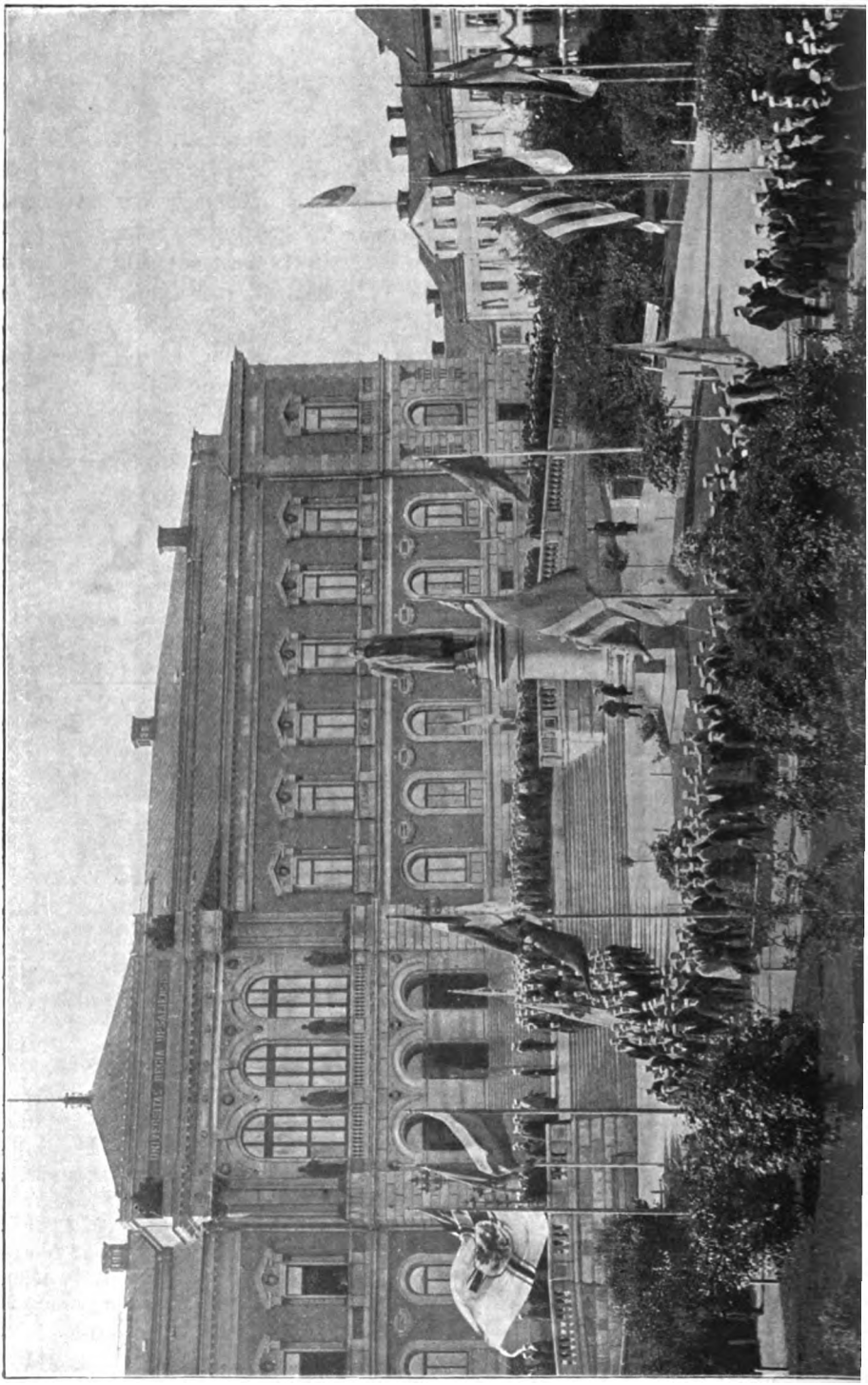

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The immediate care and supervision of all that concerns the university is exercised by its **rector,** who is elected for two years at a time by the greater consistory (cf. below) from among the professors in ordinary, and may be re-elected. In the absence of a rector, the office is exercised by a *vice-rector* who is elected in the same way and for the same length of time.

The rector is assisted in the government of the university by the two academical consistories, in which he is the chairman. The **greater consistory** consists of all the professors in ordinary, and has the care of all the more important affairs of the university, proposes candidates for the filling of vacant professional chairs, grants stipends etc. The **lesser consistory** consists, besides the rector and vice-rector, of five other members who are elected for three years. It has to enforce the observance of the prescribed regulations respecting the lectures and examinations, execute the disciplinary authority of the university, etc. There is also a *finance committee* for the administration of the purely economical affairs of the university. It consists of a treasurer and three members of the greater consistory, chosen for a period of three years from amongst the teachers in ordinary of the university.

At the **Caroline Institute,** the government and administration is exercised by a *Rector*, who is chosen for a period of three years by the college of teachers from among its members, and by the *college of teachers*, which consists of all the professors in ordinary and the associates of the Institute. A *Dean*, chosen every year from amongst the college of teachers, acts as vice-rector and as vice-chairman of the college.

According to the statutes at present in force (confirmed 1876, altered 1891), the teachers of each of the two State universities are distributed, with respect to the different sciences they represent upon **four faculties,** viz. the faculties of theology, law, medicine, and philosophy. The last named is further divided into *two sections*, viz. the section of humanistics and that of mathematics and natural sciences. Each faculty or section consists of its ordinary and associate professors, who every academical year, from among its members, appoint a chairman called *dean*. The degrees conferred by every faculty are those of *candidate*, *licentiate*, and *doctor*. Doctors of divinity, however, are named by the Government, without examination. Besides, certain civil service examinations are passed in the faculties of theology and law.

Professors at the universities are either *ordinary* or *associate*, of which the latter have smaller salaries, and are not entitled to a pension. There are also permanently appointed *laboratory assistants* in the various medical and scientific laboratories, an *astronomical assistant* for each of the observatories, and an *assistant* in the theological faculty. Besides these, an indefinite number of *docents* can be appointed for each professorship. The practical instruction in modern languages is given by *lecturers*. Special teachers, called *instructors*, are appointed for the teaching of gymnastics, music, and drawing.

Appointments. Vacant professorships are filled either on application, or by direct appointment. In the former case the position must be publicly announced vacant. When candidates within a prescribed limit of time, have applied and presented their testimonials of competency, the respective faculty or section, upon the

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University Palace, Uppsala. Entrance Hall.

written argumentation of at least three specialists in the subjects concerned, express themselves regarding the fitness and relative competency of the applicants. Then the greater consistory proposes three of these applicants for appointment in the order of their relative merits. Against this recommendation an appeal may be made to the King. After the vice-chancellor and the chancellor have expressed themselves, the appointment is made by the Government. — But if there is a prospect of acquiring for the vacant professorship a scientific man known for extraordinary skill, the respective faculty or section may, before the place is publicly declared vacant, by a majority of $^2/_3$ of its members, determine to offer him the position. In such a case the method of procedure is simplified by sending the recommendation of the faculty, together with the opinion of the greater consistory and of the vice-chancellor, to the chancellor, who presents it, together with his own opinion, to the Government for decision. — Laboratory and observatory asisstants are appointed in a similar way, only that the chancellor makes the final appointment. Docents are appointed by the chancellor on application, or on recommendation by the professor concerned, after the faculty or section in question has given its opinion. — The above system of promotion being, in many cases, considered antiquated, the Government has appointed a committee to propose reforms, and this committee has recently (1901) submitted its report, recommending various changes in existing conditions.

The total **number** of teachers at the universities and the Caroline Institute amounted in 1900 to 289, of whom 76 were professors in ordinary, 56 associates, 20 laboratory and astronomy assistants, lecturers etc., and 137 docents. Of the 132 ordinary and associate professors, 14 belonged to the faculty of theology, 15 to the faculty of law, 48 to the faculty of medicine, 31 to the humanistic section of the faculty of philosophy, and 24 to the section of mathematics and natural sciences of the same faculty. Of the whole number, 61 belonged to the University of Uppsala, 49 to the University of Lund, and 22 to the Caroline Institute.

The salaries of the professors in ordinary is 6,000 kronor (with an advance of 500 kronor after five years of service, and another after ten); of the associates

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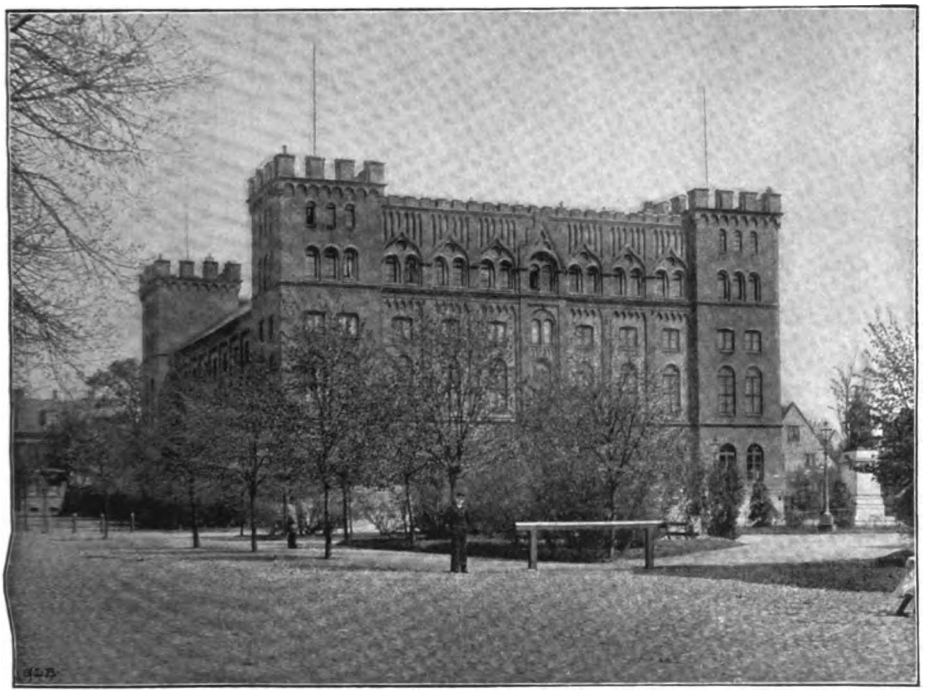
4,500 kronor, likewise with the two said advances. Assistants in the medical faculties receive 4,500 kronor, those in the philosophical faculties and observatories, 3,000 kronor. The docents have no fixed salaries, but the State has established, for their benefit, a number of docent stipends of 1,500 and 1,200 kronor (14 + 5 at Uppsala and 10 + 5 at Lund), which, on the recommendation by the respective faculty, are given by the chancellor to deserving docents for a period of three years, subject to extension. The university lecturers in modern languages each receive a yearly fee of 2,000 kronor. (A krona = 1·10 shilling or 0·268 dollar).

Ordinary professors (but not associates), are entitled to a **pension** of 4,500 à 5,500 kronor, on attaining 65 years of age. This latter amount is given to those who have held their professorship ten years at the least. In some cases the Riksdag has granted a pension of 3,000 kronor to associate professors. Widows and children of deceased professors (ordinary or associate), as well as those of any deceased official of the universities, receive pensions from special Pension-funds, to which every official must contribute.



The Academical Society's building, Lund.

The Academical Year begins September 1 and is divided into the *Autumn-term* (Sept. 1—Dec. 15) and the *Spring-term* (Jan. 15—June 1). Both the ordinary and the associate professors are, as a rule, bound to lecture publicly on their science one hour four days a week. All public instruction, whether by lectures or seminary exercises, is free of charge. But the private instruction, given for the most part by the docents, is paid for.

The courses of study are at Swedish universities unusually long. On an average, 6 to 8 years are required for the degree of licentiate of philosophy, 7 years for the candidate's degree in law, 9 years for the candidate's degree in theology

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(for the ordinary examination for Holy orders 5 years), and for licentiate's degree in medicine, as much as 11 years. In part, this condition of things depends upon the comprehensive studies which are required, but in part also upon the somewhat unpractical arrangements in regard to teaching. Attempts have been made, during the last few years, to find a remedy for the latter defect by the establishment of the so-called propædeutical courses for the preparatory examinations, and at present a *Royal Committee* is busy with working out a plan for the reorganization of the academical examinations.

Students. To matriculate at the university a student must have passed the university entrance examination (the final examination at a Higher State College).

Every student must belong to one of the **nation-societies** or »Landskap» into which the body of students has been divided from olden times, for the promotion of industry and morality and for mutual aid. At Uppsala there are 13, and at Lund, 12 »nations», each comprising, in the main, students from special parts of the country, and each under the control of an *inspector*, chosen by the society itself from amongst the ordinary professors of the university. At Uppsala these societies usually have their own houses (clubs) and the disposal of pretty large funds; at Lund the students possess in common a large building called the Academical society's building. — The part played by the nation-societies in Swedish student life has been notably great and important. The student's badge is the beautiful »white cap», known also abroad from various singing tours made by the students. — By the side of the nation-societies may be noticed a number of *special societies* for scientific work, athletic exercises, etc., as well as for music and singing, in which latter respects the Swedish students have won universal reputation.

TABLE 52. *Number of University students in Sweden.*[1]

Average number, Autumn and Spring-terms.	Mean population.	Number of students.					Total.	Per 10,000 inhab.
		Uppsala.	Lund.	Caroline Institute.[2]	Stockholm.[3]	Gothenburg		
In 1870	4,164,000	1,403	454	54	—	—	**1,911**	4·59
1871/75	4,274,000	1,554	542	82	—	—	**2,178**	5·10
1876/80	4,500,000	1,448	612	153	—	—	**2,213**	4·92
1881/85	4,605,000	1,660	807	253	40	—	**2,760**	5·99
1886/90	4,742,000	1,825	889	375	46	—	**3,135**	6·61
1891/95	4,832,000	1,564	728	380	50	32	**2,754**	5·70
1896/00	5,032,000	1,495	637	326	47	59	**2,564**	5·10
In 1900	5,117,000	1,449	642	294	40	67	**2,492**	4·87
» 1902	5,187,000	1,497	688	298	55	81	**2,619**	5·05

The number of university students in Sweden during the years 1870/1902, is found in Table 52. As may be seen, the total number has varied very much. The decline of late years must be partly ascribed to a decrease in the number of matriculated students (cf. Table 51), but partly also to a more rapid completion of required courses. Among the total of 2,529 students in the Autumn of 1900, 276 belonged to the theological faculty, 443 to the law faculty, 514 to the medical, and 1,296 to the philosophical, in which last number are included students preparing for the preliminary examinations hitherto required for entrance into the three other faculties. Amongst the students of 1903 (Spring) there were 89 women.

[1] According to G. ENESTRÖM, and to »Report on the School-Question» by N. HÖJER, A. LINDHAGEN, and S. BOIJE. — [2] In Stockholm. — [3] The private University of Stockholm.

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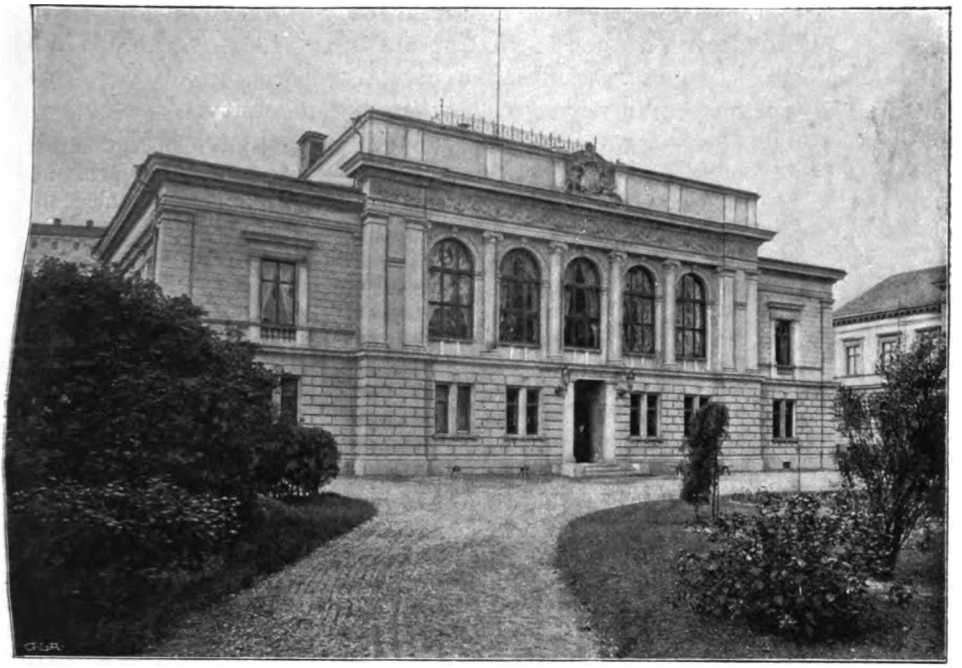

Club House of the Östgöta Nation, Uppsala.

In addition to recently erected magnificent **university buildings,** with splendid solemnity halls, lecture-halls, assembly-rooms for the consistory and the faculties, etc., each university possesses several valuable *collections* and *institutions*, each with their own buildings and officials. Thus, in *Uppsala* may be especially noticed the University Library (Carolina rediviva) with more than 330,000 volumes, besides pamphlets in 10,000 cases, and 12,500 manuscripts; the Botanical Gardens, laid out by the celebrated Olof Rudbeck, and developed by Linné; the Astronomical Observatory with a new tower and a large refracting telescope; the Academical Hospital and the Central Asylum for lunatics with medical and psychiatric clinics; the anatomical, physiological, pharmaceutical, physical, chemical, meteorological, and zoological institutions, etc. In *Lund* may be noticed in like manner, the University Library with 185,000 volumes, over 6,000 cases, and about 5,000 manuscripts; the Coin Cabinet, one of the oldest existing collections in its way; the Zoological Museum, established by Sven Nilsson; the Geological Museum, founded by Otto Torell; the Astronomical Observatory; several other institutions for medicine and natural sciences of great value, etc. In connection with the *Caroline Institute* in Stockholm are the clinics at Sabbatsberg and other hospitals there, as well as a newly erected *Dental Institution* (1898), under the direction of the Institute.

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In furtherance of scientific research, each university issues an **annual publication** (Årsskrift; in Uppsala since 1861, in Lund since 1864), in which appear, besides the annual reports, scientific papers written by persons having connection with the university.

In this connection may be noticed also that the *Caroline Institute* from the year 1901 awards one of the five great Nobel prizes, viz., the prize for »discoveries in the domain of physiology and medicine» (cf. p. 378 under the heading The Nobel Foundation).

The total **expenses** amounted, in 1902, at the university of Uppsala to 1,019,000 kronor; at the university of Lund to 566,000 kronor; and at the Caroline Institute to 247,000 kronor, or altogether to 1,832,000 kronor. Of this amount, the universities supplied part from their own funds, viz., the university of Uppsala about 450,000 kronor; the university of Lund about 150,000 kronor; and the Caroline Institute 22,000 kronor. As may thus be seen, these establishments possess considerable private means. That is particularly the case with the university of Uppsala, which, amongst other things, from Gustavus Adolphus received the magnificent gift of 360 farms of his private dominion, the rents of which form, at the present day, one of the most important resources of the university.

There exist in addition, for the aid of young students, important *stipend funds*, partly under the administration of the universities, and partly under that of other authorities. The total amount of these funds is at the university of Uppsala about 3,000,000 kronor; at the university of Lund about 1,300,000 kronor, and at the Caroline Institute about 300,000 kronor, or altogether about 4,600,000 kronor.

The so-called **University extension movement** is treated of above, p. 317.

Private Universities.

As already mentioned, two such establishments (called Högskolor) have been founded of late years, viz., in Stockholm and in Gothenburg, of which the former commenced its work in 1878, and the latter in 1891. The higher direction of the affairs of these institutions is confided to special Boards of directors under the superintendence of the *Chancellor* of the State Universities. The institutions are placed under a Government control, the University of Gothenburg from its beginning, that of Stockholm only since 1904; the statutes are confirmed by the Government, and the Presidents of the Boards are appointed by the same authority for such a time as in each case may be decided. The directors determine, within the amount of money available, what offices shall exist at the university, and the salaries attached to them. The Directors have also the power, after hearing the reports of the Council of teachers and selected specialists, to appoint professors, either after application or directly; but the appointment must be submitted to the approval of the Government. Docents are appointed by the Board upon the recommendation of the Council of teachers and after Chancellor's hearing. The Board has also the power, in certain cases, to dismiss a teacher, but not without an examination by the confirming authorities and their approval.

The University funds are placed under the administration of the Financial Boards of the respective cities.

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A) **The University of Stockholm** (Stockholms Högskola). The *Board of directors* is constituted in the following way. As aforesaid, the Government appoints one member, viz., the President, the Swedish Academy also chooses one, the Academy of Sciences two, and the Town Council of Stockholm two; the rector of the university is a member ex officio, and the eighth member is chosen by the seven before mentioned, and, like these (excepting the President), for three years at a time. The Board selects annually from amongst its members a second chairman and an inspector.

The immediate direction of the institution is exercised by the *rector* (chosen by the council of teachers for two years at a time), and by the *Council of teachers*, consisting of the ordinary teachers or their temporary substitutes. The university is intended in the future to comprise four faculties: one of history and philosophy, one of philology, one of mathematics and natural sciences, and one of jurisprudence and political science. At present, however, only the *faculty of mathematics and natural sciences* has been established. Besides, there exists professorships in the history of art and history of literature, and lectures have been given in history, political economy, and other subjects. A *faculty of jurisprudence and of political science* is planned for the immediate future.

No *examinations* are hitherto passed at the university. Its work has been exclusively in the interest of scientific investigation and education. Yet, recently a proposition is made to secure the privilege of examining for university degrees, which may be decided upon by the Government early in 1904.

In the autumn term 1903 there were at the university 9 ordinary professors, 3 temporary teachers, 15 docents, and 7 amanuenses. Of the professors three received 7,000 kronor, the others from 6,000 to 4,500 kronor (à 1·10 shilling). The docents are ordinarily unpaid, but the amanuenses receive from 1,250 down to 500 kronor. Teachers who have reached 65 years of age and been in the service of the university for at least 30 years have a right to a pension amounting to 70 or 80 % of the salary at the time of resignation.

The academical year of the university begins Sept. 1 and is divided into two terms (Sept. 1—Dec. 15 and Jan. 15—June 15). The professors must give two public lectures every week, and impart the instruction and directions necessary for the pupils' studies. Most of them are also directors of some scientific institution. — During the years 1901/1903 the average number of students amounted to respectively 47, 55, and 58, and the corresponding number of attendants to 82, 64, and 102.

Under the direction of teachers at the university, and with a government support (3,000 kronor yearly), is issued the international magazine *Acta mathematica*, which contains papers in French, German, and English on higher mathematics. Other results of investigation at the university are to be found in the *Meddelanden från Stockholms Högskola*, a series of scientific papers, hitherto inserted under this title in the publications of the Academy of Sciences.

The funds of the university amounted at the beginning of 1903 to a total of about 4,600,000 kronor, stipend funds of 438,000 kronor included; its *annual budget* amounted in the same year to 136,000 kronor. The lecture-halls and the institutions are still in rented buildings, but the university has received, as a gift, a suitable site for buildings of its own.

B) **The University of Gothenburg** (Göteborgs Högskola), having from the beginning placed itself under Government control (statutes of 1889 confirmed by the Government), has, in consequence of this, received (in 1893), within certain limits, the right of holding examinations for university degrees.

The *Board*, consisting of nine directors, is appointed in the following manner. The president, as mentioned above, is nominated by the Government for such a time as in each case may be decided, four members are chosen by the Town Council

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of Gothenburg, one by the Royal Society of Science and Literature in Gothenburg, one by the directors of the Gothenburg Museum, and one by the ordinary members of the united staffs of the Higher Classical and Scientific Colleges of Gothenburg, all (excepting the President) for three years at a time; the rector of the university is a member ex officio.

The immediate government and care of the university are exercised by its *rector* (who is chosen for three years at a time by the council of teachers from among its ordinary members) and by the *Council of teachers*, which consists of the ordinary professors at the university or their temporary substitutes. The university is intended to comprise, in the future, first, a faculty of humanistics; then a faculty of mathematics and natural sciences; and afterwards a faculty of law. At present only such teaching is carried on as can be considered as belonging to *the faculty of humanistics*. The examinations at the university are held by an examination-commission, consisting of a chairman appointed for a certain time by the Government, and of the examiners in all the examination subjects.

In the spring term of 1903 there were at the university of Gothenburg 11 professors, 4 docents, and 2 lecturers in modern languages. The salary of the professors is 6,000 kronor, with the right to a pension of 80 % of the salary on reaching 65 years of age, and after 30 years service at the university. The docents receive 4,000 kronor, 3,000 kronor, and 1,500 kronor per annum. The lecturers are paid chiefly by the fees for their instruction.

The academical year of the university begins Sept. 1 and is divided into two terms (Sept. 1—Dec. 15 and Jan. 15—June 15). Those partaking of the instruction are partly *regular students*, who have been matriculated after passing the common university entrance examination, and partly *special students*, who by permission of the different teachers, and on payment of special fees, attend certain lectures or exercises, and partly *auditors*, who attend the public lectures free of charge. The number of regular students at the university, during the spring term of 1903, amounted to 85, of special students to 117, and of auditors at the public lectures to 1,576.

The university of Gothenburg, with the support of a fund, donated for the purpose, issues a *yearly publication* (since 1895) containing scientific papers and accounts of the university work during the year. A series of *popular scientific monographs* has also begun to be published by the teachers of the university.

The funds of the university, which are placed under the administration of the Financial Board of the city of Gothenburg, now amounts to about 3 million kronor. Its budget for the year 1902 was 100,000 kronor. *Stipends* to the amount of about 6,500 kronor are distributed annually. The lecture-halls, etc., of the university are as yet in a rented house; but recently it has received a donation of 450,000 kronor for the erection of a building of its own.

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4. TECHNICAL EDUCATION.

Technical education at the present moment holds a very high position in Sweden. With regard to the considerable distances, it were, however, to be desired that schools for elementary instruction within this department became more numerous than now is the case, and also the higher institutions stand in need of being enlarged.

Higher, scientific instruction in technical subjects is imparted at the Technical High School in Stockholm and at the Higher division of

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Chalmers' Polytechnical College in Gothenburg. In the second rank follow the Lower division of the above mentioned Chalmers' College, the five Technical Colleges mentioned further on, and a special Technical School at Eskilstuna. A multifarious instruction and education are offered at the Technical School in Stockholm; finally, there are about forty Lower Technical Schools in smaller towns.

The Technical High School in Stockholm.

A) **The Technical High School.** By Royal Letter of May 18, 1825, the establishing of this institution was enacted; the statutes now in force are of June 28, 1901. The chairman of the Board is appointed by the Government, likewise four members of the Board on proposal of the Council of teachers at the school; one member is appointed by the commissioners of the Iron Institute (Järnkontoret); ex officio member of the Board is the principal of the School.

The **Pupils** of the High School are partly *regular* ones — who, on entrance, have given proof of possessing the necessary preparatory education, and who follow the instruction to the extent necessary for obtaining a full certificate of competence —; partly *special* students — who follow the instruction in fewer subjects, and who, on entrance, have shown that they possess a certain amount of knowledge prescribed by the Board; these have the right to obtain certificates in those subjects they have studied —; and, finally — in case of places being found at disposal — *outsiders*, who without having presented certificates of insight and without admittance examination, receive instruction in subjects chosen by themselves; these have no right to a certificate. Regular and special students

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are received at the beginning of each school-year (in September). For regular pupils the term fee is 50 kronor. — As special students and as outsiders also *women* may be admitted.

The **admission requirements** demand producing a final diploma, either from a Higher State College on the scientific line, or from the classical line with supplementary credits in mathematics, physics, chemistry, geometrical and freehand drawing, or from a Technical College with supplementary credits in Swedish, foreign modern languages, history and geography.

The **instruction** is imparted by 12 professors nominated by the Government after proposal of the Board, 10 masters in ordinary appointed by the Board, 13 associate masters and 3 lecturers commissioned by the Board, assistants and associate-assistants.

The High School includes special **divisions** for: A) *machine design and mechanical technology*, with a triennial or quadrennial course, or else naval engineering; B) *electrotechnics*; C) *chemical technology*, with a triennial course; D) *mining* — divided into: classes for mining mechanics, with a quadrennial course; metallurgy and smelting, with a triennial or quadrennial course; and mining proper, with a triennial or quadrennial course; E) *architecture*, with a quadrennial course and the instruction so arranged that the pupils after three years' study have the right to proceed with their studies at the Academy of Arts; and F) *civil engineering*, with a quadrennial course.

The **subjects of instruction** are: pure mathematics, embracing the theory of equations and of determinants, analytical geometry, the differential and integral calculus, differential equations, and the elements of the method of least squares; descriptive geometry; geodesy and topography; theoretical mechanics, with an elementary and a higher course; descriptive mechanics together with mechanical construction and the construction of simple parts of machines; the theory of practical mechanics and mechanical construction, with the necessary exercises in construction; mining mechanics; the theory of steamship construction; mechanical technology, with strength tests and mechanical laboratory work; physics; applied pyrology; theoretical and practical electrotechnics; general and analytical chemistry, and chemical technology, with chemical and chemico-technical laboratory work; electrochemistry, with laboratory exercises; zymology; mining chemistry; the metallurgy of iron and other metals; the art of smelting, metallurgical laboratory work; mineralogy and geology; mining; general theory of building; building statics; house building; architecture; the history of the art of building; civil engineering; geometrical drawing; freehand drawing; decorative designing; modeling; political economy and commercial law; technical hygiene and workshop practice.

The maximum number of pupils in the first division was, in 1890, fixed at 80. Though this number, in 1892, was increased to 100 and in 1899 to 125 (besides special pupils), a great many competent applicants have of necessity been rejected each of the following years, the number of applicants to this division having amounted during the years 1896/1902 respectively to 103, 144, 170, 195, 233, 223, and 177. The total numbers of regular and special pupils were, during the years 1896/1902 (spring terms), respectively 305, 277, 283, 309, 360, 373, and 393. — The numbers of graduates, during the years 1896/1902, were respectively 107, 67, 79, 88, 87, 89, and 96.

The ordinary **government grant** to the High School originally amounted to 21,000 kronor (à 1·10 shilling or 0·268 dollar) and has repeatedly been raised, on account of the extension of the institute, so that, in 1902, it amounted to 197,900 kronor. A special grant of 22,400 kronor was made for the year 1900. During 1902, the students' fees came to 41,000 kronor. A sum of 16,435 kronor was that same year distributed as stipends. At the end of 1902, the total amount of the 16 stipend funds was 326,748 kronor.

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An **Institution for the testing of materials** — with a director of its own — was established 1896 in connection with the mechanical laboratory. Its object is to test metals, building stone, cement, and above all the strength of various building materials; and such tests are made also for the public according to taxes and regulations fixed by Government, February 25, 1897.

B) **Chalmers' Polytechnical College** in Gothenburg dates its origin from a donation of 105,689 kronor made in 1811 by William Chalmers, for the establishing of an »industrial school» under the control of the Board of the Freemason Orphanage in the above named city. The institute, which since 1829 has had the character of a technical scientific college, has enjoyed State support since 1835. The Board consists of 7 members, viz., the governor of the province as chairman, the bishop of the diocese, the principal of the college, one manufacturer, and three out of the members of the Board of the Freemason Orphanage. At present, the college is divided into a Lower division with a triennial course; and a Higher division with a triennial course and subdivided into five sections or professional schools: one for mechanics, one for electrotechnics, one for technical chemistry, one for the art of building and one forming a special school for shipbuilding. In 1883, the name of the institute was changed into the present one: Chalmers' Polytechnical College. The regulations now in force date from November 14, 1902.

The instruction is conducted by 7 masters in ordinary (one of whom is the principal besides and has the title of professor) and 12 other teachers and assistants. The number of students, which during the years 1881/85 averaged 110, has since then highly increased, so that during the years 1886/90 it averaged 153; during 1891/95, 227; during 1896/1900, 266; and in the spring term of 1903, 431, not counting 18 outsiders.

In the **Higher division** of the college the instruction embraces chiefly the same *subjects* as in the Technical High School in Stockholm — with the exception of those referring to mining — and theoretical and practical shipbuilding, ship-construction, and measurement of vessels besides. The pupils are classified on the same principle as at the High School: into regular, special, and outside students. The admission requirements consist either in a final diploma from a Higher State college or in special examinations in mathematics, Swedish, German or English, history and geography.

The subjects of instruction in the **Lower division** are: arithmetic, algebra, equations of the 1st and 2nd degrees with problems, maxima and minima, logarithms, plane trigonometry, geometry with the theory of proportions, planimetry and stereometry; elementary physics and chemistry; electrotechnics; elementary mechanics; the principles of the theory of practical mechanics; the manufacturing of iron and wood; the principles of theoretical and practical shipbuilding, geometrical and freehand drawing, modeling; Swedish; German; book-keeping; metal- and wood-working in the workshop.

At the end of 1902, the *donated funds* amounted to 387,117 kronor, of which sum 325,828 kronor was the value of the buildings and movables. The college had, at the end of 1902, four stipend funds with a total value of 15,561 kronor. A State subvention of at present 90,300 kronor is yearly granted.

Also in connection with this college, an *Institution for testing of materials* was etablished in 1888; it enjoys an annual State grant of 1,500 kronor.

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The Staff consists of a director for the mechanical department, another for the electrotechnical one, an assistant, and a machinist.

C) **The Technical Colleges** impart both theoretical and practical instruction in the elementary branches of technical knowledge to those who intend to devote themselves to industrial pursuits. The oldest of these colleges in question, that of Malmö, received its statutes April 29, 1853; the other three older, in Norrköping, Örebro, and Borås, received theirs March 12, 1856. The regulations now in force were issued for all these colleges June 15, 1877 with alterations of December 10, 1886. A fifth college of this description (with the same statutes) was established at Hernösand in 1901 and is complete with three courses since the school-year 1903—1904.

The Board at each of the Technical Colleges consists of a chairman and one member appointed by the Government, the headmaster, and two members appointed by the Town Council.

The course of instruction covers three years; the school-year consists of 36 weeks. The minimum age of entrance is fixed at 14. The admission examination embraces Swedish, mathematics, history, and geography. Youths who have passed the fifth class of a State college with certificates of knowledge in these subjects, are exempt from the admission examination within a space of two years after leaving the college. The admission fee is 10 kronor; the term fee, 10 kronor at most. The instruction is at each of these schools imparted by four lectors, a workshop foreman, and a certain number of associate teachers. The number of pupils amounted during the spring term of 1903 to 416 in all the five schools together.

According to the statutes in force, the *instruction* shall comprise: Mathematics, viz., a) arithmetic, algebra, planimetry, stereometry, the theory of series and logarithms, plane trigonometry, and the first principles of analytical geometry; b) descriptive geometry together with geometrical drawing; c) practical geometry, surveying, leveling with drawing and field exercises. — Mechanics: a) the laws of the equilibrium and movement of bodies; b) the theory of mechanics, machine drawing and design of simple machines and parts of machines; c) mechanical technology. — Natural philosophy: experimental physics with reference to the most important applications of that science in industries. — Chemistry, inorganic and organic, with laboratory work, and chemical technology. — Mineralogy and geognosy. — Swedish and German, English or French according to the final decision of the different Boards of directors. — Book-keeping and the science of commerce; building; freehand drawing and modeling; work in the workshops; gymnastics and exercise of arms.

D) **The Technical School of Eskilstuna,** opened under another name in 1855, was enlarged in 1872, and when, in 1888, the Town Council had voted a grant to a professional school for finer cutlery and metal industries, these establishments were united in 1890 under the present designation.

In the older division — the **Sunday and Evening School** — the instruction embraces: mathematics as at the Technical Colleges, with the exception of the first principles of analytical geometry; mechanics, natural philosophy, and chemistry as at the Technical Colleges, chemical technology excepted; Swedish with composition; German or English; copywriting; freehand drawing and modeling; book-keeping, to meet the requirements of industries; building; — in the **Professional School for cutlery and metal industries:** freehand drawing with the principles of style, modeling, wood-carving, engraving, metal-casting, enchasing, embossing, etching, galvanizing, forging, filing, and turning.

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In the Sunday and Evening school, the instruction is imparted by 11, in the Professional School by 4 teachers. During the years 1890/1903 the numbers of students in the Sunday and Evening school were (in the spring-terms) respectively 156, 155, 135, 138, 129, 124, 130, 144, 154, 173, 156, 172, 173, and 205, and in the Professional school for finer cutlery and metal industries, 18, 30, 24, 33, 25, 31, 31, 28, 25, 23, 40, 28, 34, and 42 respectively. — The School has 9 prize and donation-funds, the total of which, in 1902, amounted to 27,835 kronor.

E) **The Technical School of Stockholm** opened as a private school in 1844, has since been often enlarged and reorganized, and finally, in 1860, became a State school. It was thoroughly remodeled in the years 1878 and 1879, when its activity was restricted within the limits of purely technical instruction, and when a higher Industrial art school and a professional building school were established. After the preparation of fixed courses of study — 20 for the so-called evening school and 11 for the women's department — the instruction of the Higher Industrial Art school has been grouped in two sections: one for industrial arts (with five professional divisions), the other a Training school for teachers of drawing, writing, and modeling. In 1890 was added a professional school of mechanics with 7 professional divisions. The regulations, issued in July 1891, were renewed with additions in 1895.

The School Board consists of a chairman, the director of the School, and one member — appointed by the Government, — and four other members appointed by the Town Council, the Council of teachers at the Technical High School, the Academy of Arts, and the direction of the Swedish Industrial Art Society (Svenska Slöjdföreningen). The school work is carried on in five head departments: I) the Technical Evening and Sunday school; II) the Technical school for Females; III) the Higher Industrial Art school; IV) the Professional Building school; and V) the Professional school of Mechanics. Besides, instruction is imparted in the principles of style, art needlework, professional and decorative painting, photography, form anatomy with drawing, a course for electrical fitters, and gymnastics.

During the school-year 1901—1902, the *total of students* was 2,171, a considerable number, testifying strongly to the importance of this school in the technical education of our country. The number of *teachers* was 92, of whom 32 in ordinary. — At present a plan is being worked out with the purpose of a further extension and comprehensive changes in the organization of the school, chiefly by dividing it into several educational institutes in different parts of the city. — In the *budget* of the school — about 132,000 kronor — the State grant amounts to 97,075 kronor; the annual contribution from the city of Stockholm, to 10,250 kronor; and the pupils' fees, to 19,000 kronor.

F) Finally we have to mention the **Lower Technical Schools** — at present 41 in number — whose activity varies according to the special branches of industry prevalent in the districts where they are located. They are supported mainly by the communities of these places, but stand under State inspection, and also receive State grants: in 1900, to a total amount of 60,000 kronor. In 1900, the number of teachers at these schools was 293 and that of the pupils, 6,817, of whom 1,275 females.

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G) The previous account of the polytechnic instruction in Sweden confirms our above pronounced opinion that it occupies a high place in our days. It is, however, not to be denied that *the pure practical training* has been, in some degree, neglected. In order to mend matters, the Town Council of Stockholm, in April 1901, appointed a Committee, which should investigate the case and bring forward a proposal for the improvement of the practical instruction in mechanical arts. Experts have therefore been sent abroad for the purpose of studying the question, and printed forms with questions have been sent round to our chief manufacturers and employers of artisans, in order to learn their opinion in the matter. The work of the Committee is not yet finished, but there is good hope that the result will be the founding of a number of **Professional Schools**, where the instruction should be given in *technical evening classes*, specialized more than at present for each different branch, and in exclusively practical, elementary *classes for mechanics*, as well as in *industrial schools for women*. There has already been started a School for Masons and one for Tailors in Stockholm — private enterprises, it is true, yet enjoying a considerable grant from the City.

5. SWEDISH GYMNASTICS.

Per Henrik Ling.

The Swedish gymnastics derive their origin from *Per Henrik Ling* (1776/1839). Before his time, it is true, interest had been awakened in favour of a more thorough exercise of the body. Various writers as well as school committees had urged the importance of athletic exercises in the training of the young, and both our universities had their fencing masters; but there existed nothing of gymnastics in the present sense of the term. The conception of the »Philanthropists» with regard to bodily training was never realized in Sweden.

Ling's appearance at Lund in 1805 as university fencing master was the real beginning, and by the founding of the **Central Gymnastic Institute** (1813), which was also owing to Ling's initiative, the first and most essential step forward was taken towards establishing that seat of learning whence, as Ling's prophetic eye had foreseen,

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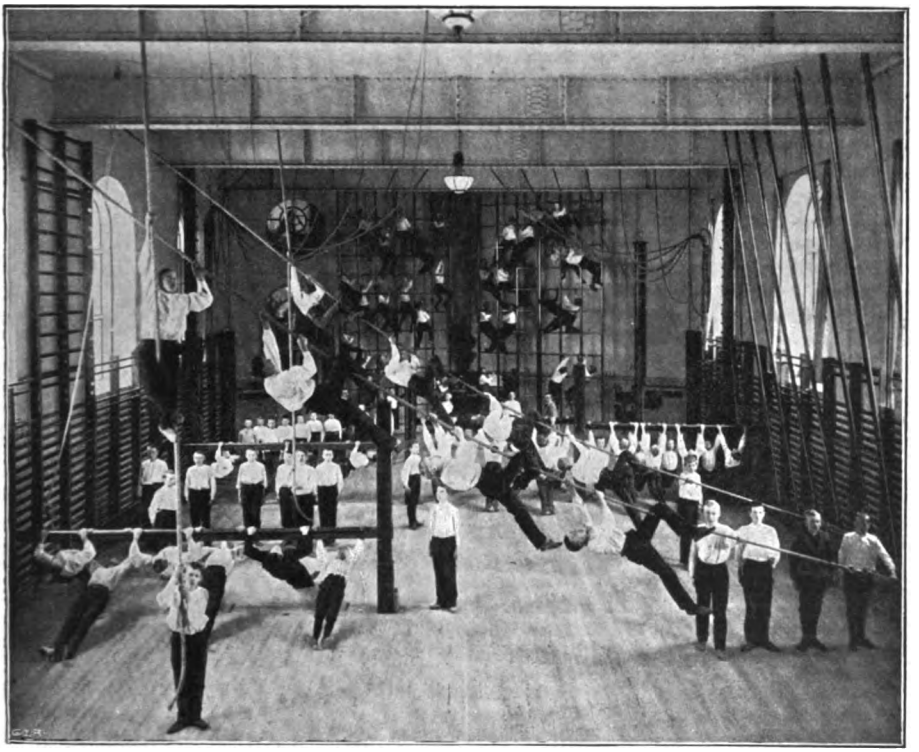
the gymnastic idea would spread throughout his country and in accordance with the outline indicated by him.

According to Ling's idea, the selection and kinds of exercises must be grounded on the requirements of the body itself. The body itself is consequently the object of, as well as the principal instrument or implement for, the performance of the work to be done. In many exercises, however, external implements are also needed, and these have been devised with *exclusive* regard to the obtaining a good result from the *necessary* exercises. Through the correct use of the implements, it becomes increasingly possible to limit more precisely the form and the scope of action of a movement. This limitation has been called localization, sometimes isolation, to distinguish it from a combination of forces, which is also necessary to obtain the effect desired. Such combination has been called synergy or co-operation.



Lesson in gymnastics to Schoolboys, Central Gymnastic Institute, Stockholm.

Ling had not time during his busily occupied life — a life also tried by adverse fortunes — to summarize and put into print a complete system of gymnastics. He published only one fairly comprehensive work on the subject, entitled *General Principles of Gymnastics.*

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In this the different branches of gymnastics are treated of — the *pedagogic*, the *military*, the *medical*, and the *esthetic*. It is shown therein how necessary it is that gymnastics should be grounded on the science of the human organism as a whole, on anatomy and physiology, and on the science of the laws of motion.

What has been done after Ling's death for the consummation of his work was, for the most part, effected by his immediate successor *Gabriel Branting* (1799/1881) and by his son *Hjalmar Ling* (1820/86). — Branting developed Ling's principles in his lectures at the Institute and he raised medical gymnastics to a high position. — Hjalmar Ling was also a skilful medical gymnast; but he paid more particular attention to the special subject of pedagogical gymnastics. He represented by very striking drawings, made by himself, thousands of forms of movements, and he formed a collection of these and arranged them, in harmony with his father's plan and views, according to their effect on the organism, into different classes. Ten classes of gymnastic movements are thus shown to exist. Some of these may with advantage be further subdivided into two or more groups. He also drew up lists of movements suited to different ages, and rendered possible pedagogical gymnastics in Common schools and in female education.

The movements in each of the above mentioned classes have been arranged in progression according to the degree of effort they call forth. In practice, movements calling for about the same degree of effort should, out of all the classes, be arranged together for a programme of exercises — a so-called »*day's exercise*» — for daily use. A number of movements requiring less exertion should be inserted among the specific ones from each class so as to fill out the day's exercise into a *complete set of gymnastic exercises*. It is, namely, requisite that every part of the body and the organs in general should receive each its needed share of the day's exercise, which, as a whole and in detail, must be accommodated to the degree of development of the pupils. The number of pupils practising at one time, which is sometimes rather large, must therefore be divided into several smaller sections, so that those who have attained the same degree of development may practise together.

That a sufficiently great effort may be called forth and at the same time overstraining prevented, the arrangement of the movements in the day's exercise should, moreover, be such as constantly to promote an equilibrium between respiration, the action of the heart and muscular work. This is obtained by making the movements act upon the provinces of the different vessels alternately, so as to increase or relax the circulation to and from various parts of the body. In connection with this, the rate of breathing must by turns be increased and slackened, while the breathing itself is drawn deeper. Beside the various movements with their different effects, a means to this end consists also in a gradually increasing exertion in the day's exercise

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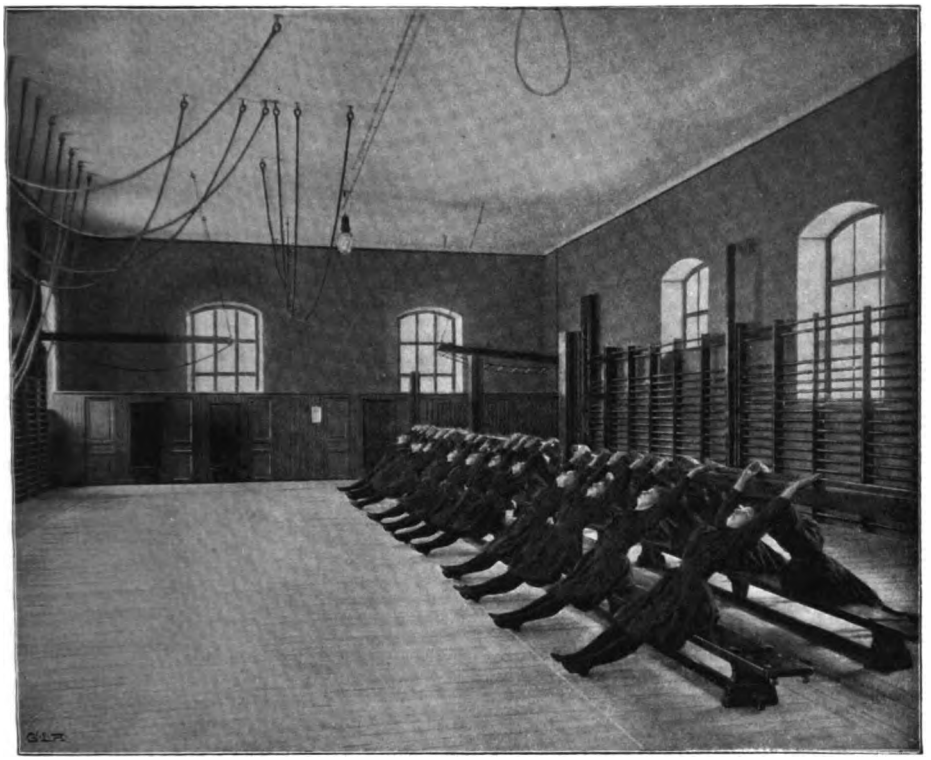
up to rather beyond the middle, after that in decreasing the exertion more rapidly towards the end; and when the whole day's exercise has been gone through, both the action of the heart and the breathing ought to be strong and deep but calm.



Pedagogic Gymnastic lesson to Lady pupils, Central Gymnastic Institute, Stockholm.

When the exercises thus arranged correspond to the disposition and ability of the individual, self-command, i. e. harmony between the nervous action and the power of performance, is produced and developed. And, since the implements of movement, the bony frame itself together with ligaments and muscles, are during the exercise the constantly working instruments, which of themselves can do nothing but only operate through the nervous influence — it is evident that the development of a calm, even, and sufficiently commanding nervous system must be one of the chief aims of gymnastics. Action and reaction is the law of nature which makes itself felt here. Ling in his time said, »Muscular force or tensile power thus stands in uninterrupted connection with the vessels and nerves, wherefore the latter must be developed equally with the muscles.»

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Among the great number of movements employed in gymnastics, there are also many *exercises of application*, and the result of this, as well as of the exercises in general, must be that, in proportion as the choice of movements made is a rational one, i. e. in accordance with the needs of the organism, as far as personal aptitude allows, health and strength will be gained as well as that readiness and expertness necessary to people of culture to enable them to master and accomplish the tasks which ordinary daily life brings with it. Ling also prescribed, in complete agreement with all his views, that national athletic games should be added, as supplementary to the more regular and systematic gymnastics, holding that »an element of pleasure should pervade all». But he cautions against all excess, calling to mind the variety of human capabilities, saying, »Therefore all this exaggerated competition in gymnastics becomes a hindrance in the way of all *true* development and an encouragement to one-sided skill, that is to say a want of harmony in the development.» — The whole of this system of gymnastics is in the fullest and best sense of the word truly democratic. It is as suitable and almost as accessible for the poor as for the rich, for the weak as for the strong, and for both sexes.

The object of *pedagogical* gymnastics is to perfect health and to make the body an obedient, dauntless, and always available implement of the moral will. Just as the mental training ought to have for its special purpose the development of the good dispositions of the soul and the subjugation of its evil propensities, so the physical training by suitable exercises, ought to produce harmony amongst the powers of the body and at the same time to correct its defects and weaknesses and to prevent their development and growth. Thus, in pedagogical gymnastics there is included a purely corrective element.

Military gymnastics, or fencing, proceeds from and is based upon pedagogical gymnastics, and must in its forms of movements be grounded on both mechanical and gymnastic laws so that the available strength rightly used may achieve steadiness, quickness, and endurance.

The great expectations which Ling entertained in regard to the Central Gymnastic Institute are being regularly and surely realized. The Institute has during its ninety years' existence developed to a very considerable extent. All teachers of gymnastics, women as well as men, are trained there for all the educational establishments throughout the country, thus also for the military schools. For this purpose there are a one year's, a two years', and a three years' course for men and a two years' course for women. The three first-mentioned courses follow one another immediately and are preparatory each for the next: the third year's course is devoted exclusively to instruction in subjects for training in medical gymnastics. The number of pupils at the Institute has so increased that at present it amounts to about 115, of whom 55 are women.

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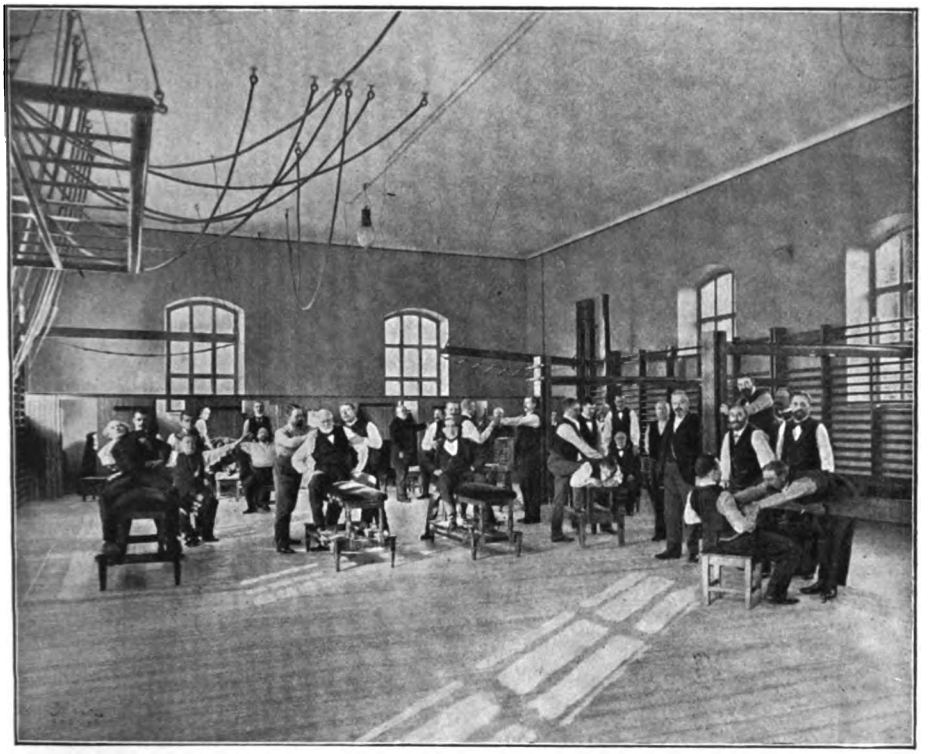
In all the State Colleges of at least five classes in the kingdom there are well-lighted and airy gymnastic halls, in which the exercises are conducted by teachers trained at the Central Gymnastic Institute. According to the statutes in force, every pupil whom the physician has declared sufficiently strong must practise gymnastics at least half an hour daily, besides which the pupils in the 6th and lower 7th classes must have two hours' instruction per week in fencing.



Medical Gymnastics, Central Institute, Stockholm.

In all the Training colleges for Common school teachers a staff of equally well trained leaders is employed to conduct gymnastic exercises for the future teachers, who during their 4-years' course are also trained to teach gymnastics in the Common schools, where gymnastic exercises are a compulsory subject. — Also at the People's High Schools the introduction of gymnastics has begun in earnest in spite of the entirely private character of those establishments. Ten of these have now their own gymnastic halls. — Besides, there exist in the larger towns privately organized gymnastics at so called gymnastic clubs, as well for women as for men, also for individuals who do not belong to any organized association but practise gymnastics only for the benefit of their health.

In the army and navy the same system is applied in schools of all grades, for recruits, corporals, non-commissioned and commissioned officers. Lastly it may be added that everywhere in Sweden the Ling system is followed.

With regard to **foreign countries** it may be stated that medical gymnastics have been more widely propagated than the other branches. Pedagogical gym-

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nastics have, however, made progress in several countries, as Norway, Denmark, England, Switzerland, America, etc.; though not to the same extent in all.

In *Norway* the staff of teachers for the schools and for the army are trained at the Central School in Christiania, founded and developed on the model of the Stockholm Institute.

In *Denmark* it is particularly at the People's High Schools, in the free Shooting Societies, and in the voluntary gymnastics of Copenhagen that the Ling gymnastics have been largely applied and with remarkable success.

In *England* a Swedish lady, Mrs. *Bergman-Österberg*, has established a gymnastic institution for the training of female teachers of gymnastics. This institution is now removed to Dartford Heath in Kent, Mrs. Bergman-Österberg having previously carried on her work in London, partly in Common schools and later at her own establishment at Hampstead. From this institution, as well as from the Stockholm Institute, many female teachers go out to various schools in different parts of England.

At Geneva in *Switzerland* Ling's gymnastics were introduced chiefly by Professor *Jentzer*, M. D., who for this purpose also translated the manual most used in our Common schools.

In the *United States of America* Ling's gymnastics are widely spread, the special starting-point having been the *Normal School of Gymnastics* founded in Boston by Mrs. *Mary Hemenway*, and which is still maintained on funds given by her. About thirty teachers of both sexes annually pass an examination at this school, after a two-years' course. A number of Swedish teachers also go out every year to the great transatlantic Republic.

Gymnastic **literature** is not very voluminous. It is limited to regulations, manuals, textbooks, and essays of a more or less casual character. Since 1874 a periodical has been published, entitled The *Gymnastic Magazine* (Tidskrift i Gymnastik). It comes out in two half-yearly numbers, and is the organ of the Scandinavian Association of Teachers of Gymnastics. Articles in German, French, and English are also inserted in it.

Medical Gymnastics according to Ling's system.

Medical gymnastics are throughout the civilized world called *Swedish medical gymnastics* (Svensk Sjukgymnastik) when it is to be shown that they are based on scientific ground. Medical gymnastics have also been developed chiefly by Swedes, especially by medical men engaged at the Central Gymnastic Institute and at the *Gymnastic Orthopedic Institute* at Stockholm. The latter was founded in the year 1822 by *Nils Åkerman*, M. D., and since the year 1827 has received a government grant. At this institute orthopedic gymnastics have obtained their greatest development, and, together with these, orthopedic apparatuses and bandages are there made use of.

As having most contributed to progress, beside the two Government institutions, ought to be mentioned the founding of the medico-mechanical gymnastics by Dr. *Gustaf Zander*, in 1857 (see below), and of Gynecological gymnastics by Major *Ture Brandt*, in 1861. Since that time medical gymnastics according to *Ling's* system have often been styled manual gymnastics.

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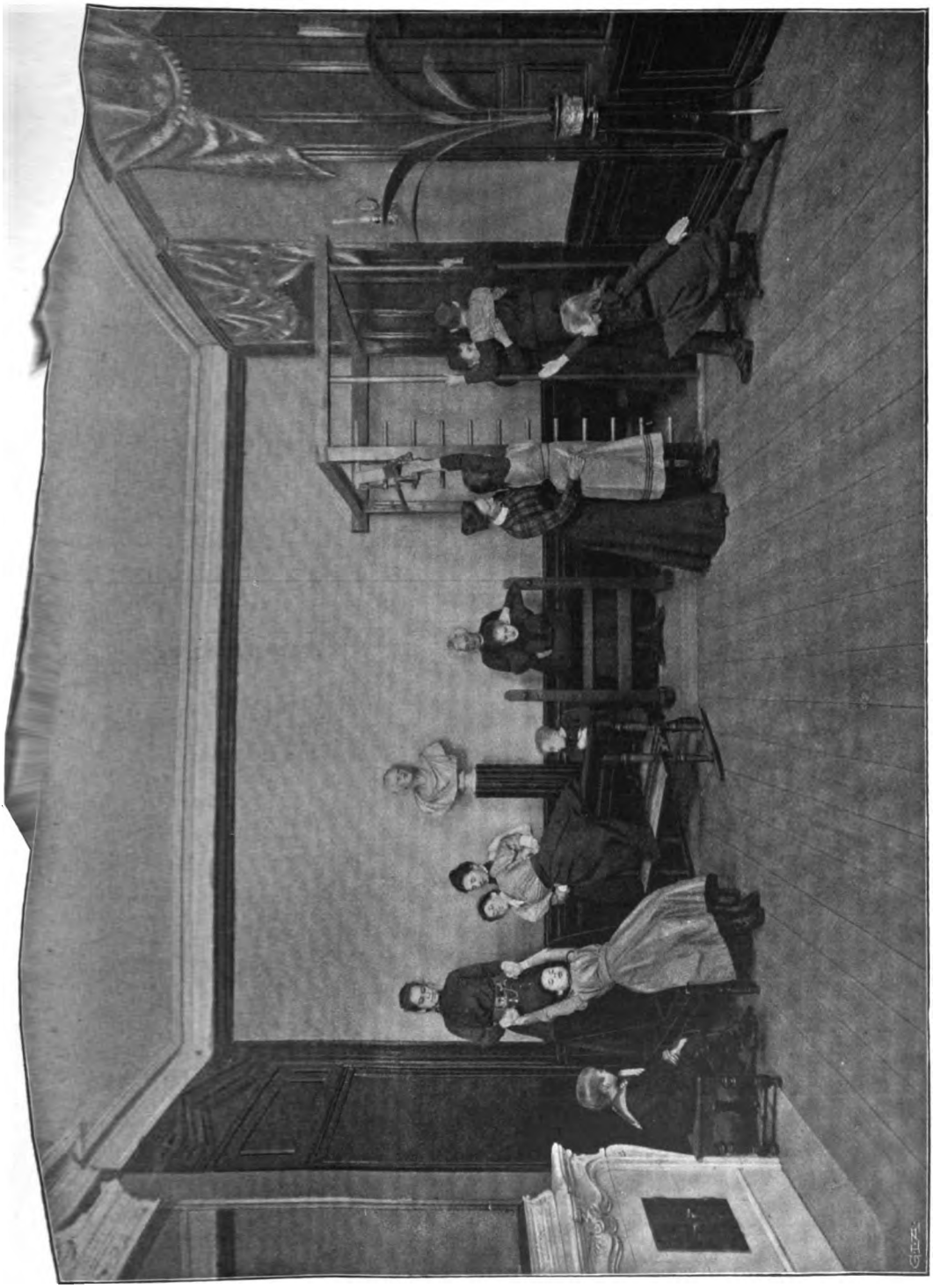

Medical Gymnastics at the Gymnastic-Orthopedic Institute, Stockholm.

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Besides the instruction at the Gymnastic Institute, short courses of lessons in medical gymnastics are given, by teachers engaged for this purpose, to the medical students at the university in Uppsala and at the Caroline Institute in Stockholm.

The Central Gymnastic Institute not being able to receive more than a limited number of pupils, several *private institutes* have arisen at the side of it for the instruction of medical gymnasts — in Stockholm as well as in the larger provincial towns. At some few of these institutes in Stockholm the teaching is good, theoretically as well as practically; at most of them, however, it falls below the mark. The certificates, given without control, do not qualify for legitimation in Sweden. The majority of gymnasts educated in this way — about 200 a year — have their sphere of activity abroad.

In almost every town and at every watering place in Sweden there exist establishments for the practice of medical gymnastics. In each year more than 4,000 patients are treated gymnastically at the larger medical gymnastic establishments and of these about 30 % gratuitously; at the watering places more than 5,000 patients are thus treated annually.

Between 1880 and 1890, Stockholm began to be visited by large numbers of foreign medical men for the purpose of studying medical gymnastics, mostly from Germany, Austria, Russia, and America; since 1890, by many from Switzerland, France, and Italy too. The Scandinavian countries had already at an earlier period profited by our practical experience.

In proportion as Swedish medical gymnastics have become known and recognized in foreign countries, Swedish teachers of the art have won positions throughout the whole of the civilized world, particularly in the larger towns and watering places in Europe, many also in America, some even in Asia.

Medical gymnastics were originally employed chiefly in cases of diseases and troubles in the visceral organs and nervous system, by and by they began to be employed for pains in the joints and for deformities of various kinds, and have recently been applied to increase the efficiency of the functions after external injuries and surgical operations, and last of all to shorten the period of convalescence after certain kinds of fever.

Among Swedish authors on this subject may be mentioned T. Brandt, T. J. Hartelius, P. H. Ling, H. Sätherberg, A. Wide, E. W. Wretlind, and G. Zander. The most complete work on the subject is the Manual in Medical Gymnastics by *A. Wide*, 1896, — also published in German, French, and English. Treatise on Medical Gymnastics by *T. J. Hartelius* was before that the work most studied, it has also been translated into German and French.

Zander's Medico-mechanical system of Gymnastics.

The elaboration of this system of gymnastics was commenced as far back as 1857 by Dr. *Gustaf Zander* at Stockholm. His first institute was started in the capital in 1865.

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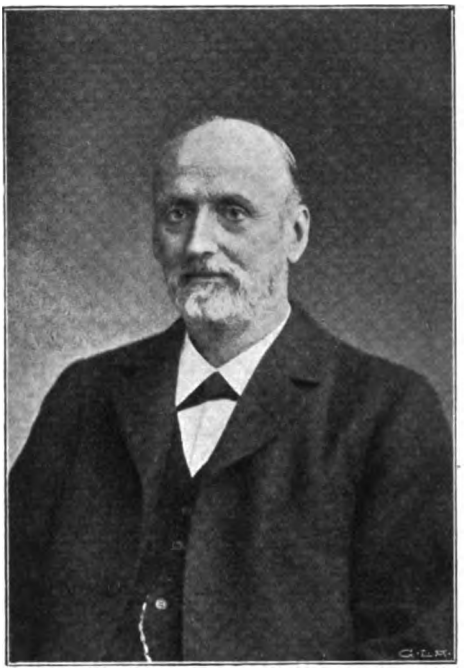

Gustaf Zander.

The Zander system has for its object to render possible by mechanical apparatus the exercise of all the muscles of the human body and to produce certain mechanical effects upon the organism as a whole or upon certain parts of it. Like the manual system of gymnastics it is based upon Ling's doctrine: that changes in the organism caused by illness can be remedied and cleared away by means of systematic muscular exercises. That a movement may be effectual it must overcome a certain amount of resistance, which in manual gymnastics is produced by the trained hand of the gymnast, but in *mechanical* gymnastics by an adjustable weight attached to a graduated lever, whereby the strength of the resistance at every moment of the movement can be measured or reckoned in figures. Every apparatus constructed for the separate groups of muscles is therefore to a certain extent to be regarded as really a dynamometer, because it measures the force of the group of muscles acted upon. If, then, the muscle has to overcome too *strong* a resistance it shows this by a tremulous and irregular movement, which indicates that the maximum of working power just then has been reached.

Besides these *active* apparatuses Zander has constructed others for *passive* movements, i. e., such as without the help of the muscles put the limbs in motion so as to stretch and soften the capsules of the joints, the sinews, the ligaments, and the muscles; and others again for so-called mechanical influence in the shape of shakings, vibrations, percussion, kneading, rolling, and friction. As characteristic of Zander's gymnastics we consider the movements for shaking, vibration, foot-rubbing, and back-rubbing. Zander has also constructed a number of *orthopedic* apparatuses for the treatment of curvature of the spine, a speciality in which he has obtained very grand results. To measure mathematically the curvatures of the spine and to be able to represent them *graphically*, Zander has constructed several so-called trunk-measuring apparatuses. A complete Zander institute has 74 different implements and appliances at its disposal.

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In this way equipped, the Zander gymnastics have been much and variously applied in the service of medicine and hygiene. They are thus employed with great advantage to develop the powers of children who cannot on account of weakness take part in the ordinary pedagogic gymnatics. They provide a wonderful dietetic remedy for persons who lead a sedentary life or have an occupation conducive to onesided development; and it may with reason be affirmed that when people grow too old for active sport, the Zander method of gymnastics offers a substitute for it.

In the province of therapeutics it is employed like manual gymnastics; first of all in affections of the heart and in nervous troubles, in which, as is well known, gymnastic treatment is superior to any other. In scoliosis, it is of the greatest importance; and in many forms of gastric trouble, such as constipation, no other treatment can be compared with it. In co-operation with the medical therapeutic treatment, it is of great value in affections of the lungs, in uterine complaints, in hemorrhoids, in general constitutional disorders, such as anæmia, abnormal accumulation of fat, diabetes, etc. In muscular and articular pains, whether from traumatic or from rheumatic causes, it is employed with great advantage. The gymnastic treatment is a remarkably suitable accompaniment to the ordinary treatment at watering places and hydropathic establishments and has, therefore, been introduced at several — in Europe as well as in America — of the larger continental watering places.

In *Germany* the Zander gymnastics have been largely employed where there is a question of treating *on a large scale* the consequences of bodily injuries caused by accidents at work. The injured workman is in that country insured by the law of 1884 and receives a certain compensation, proportioned to the permanent diminution of his ability to work. In order, if possible, to diminish the amount of this compensation, which must be paid for the duration of the disabled workman's life, such cases have been submitted to *gymnastic* treatment after recovery, partly at establishments specially appropriated to this purpose and furnished with Zander apparatuses, partly at special times at most of the larger institutes. The results have been splendid: in most places the compensation for disablement has been reduced to about 40 %.

Even allowing that such injuries are equally well treated by both our methods of gymnastics, the mechanical method must from the economical point of view have the preference, because the hand power requisite to replace this, would, even if it could be obtained, prove so costly that the profit would be simply illusory.

In Stockholm there are two complete institutes, and one furnished with a selection of apparatuses. The *Zander Institute* was between the spring of 1865 and the end of 1898 visited by 14,332 male and 5,938 female patients, or each season on an average by 596 patients. The *Östermalm Institute*, has since 1885 been visited by 3,157 male and 1,310

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female patients, thus on an average by 298 patients each season. There is a complete institute at Gothenburg, and selected apparatuses are found in Örebro and Norrköping. Complete or partially equipped institutes exist at a considerable number of places abroad. — All the Zander apparatuses are constructed in Stockholm, at the Göransson Mechanical Works, Ltd (Aktiebolaget Göranssons Mekaniska verkstad), Stockholm.

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5. TOURING AND SPORT.

Owing to the perfected means of communication in our days, touring has become a common pastime with the well-to-do classes of most countries, and through this a means of education of high value is created. To the physical development of the race, sports are of no less importance. As to Sweden, energetical efforts have been made in latter days in order to call forth among our own people a more active interest in touring and to secure to the tourist in Sweden all the modern comforts, and also to introduce healthy sports as a factor of popular education.

Touring and Touring Facilities.

From a tourist's point of view, Sweden may be said to consist of three territories, widely distinct from each other both in natural character and in the life and occupations of their inhabitants; these are: Southern Sweden, the Forest Region, and the Alpine Districts.

Southern Sweden presents to the gaze of the tourist lowland scenery of a charming character; its provinces have been cultivated from ancient times and their population is, comparatively speaking, numerous; monuments of the country's history are here to be found in great plenty, including tombs from the Stone Age, rock-carvings from the Bronze Age, and magnificent castles and country seats from Sweden's Period of political Greatness (1611/1718).

The Forest Region, or, roughly speaking, the eastern portion of northern Sweden, derives its name from the vast stretches of forest with which it abounds, broken only by huge rivers and other waters. For tourists, the principal attractions in this region consists in the great lakes, the river valleys with their multitude of majestic waterfalls, and in the busy timber trade and the salmon fishery.

The Alpine Districts, finally, or the western portions of northern Sweden, embrace a wild tract of country, where the nomadic Lapps roam about with their herds of reindeer; here the tourist has excellent opportunities of experiencing the delights of camp-life in surroundings of Alpine grandeur, for though the mountain peaks do not, it is true, exceed, in general, some 2,000 meters in height, yet, owing to the northerly latitudes in which they lie, they afford extensive glacial regions and, thanks to the frequency of mountain lakelets and the remarkable character of the birch-vegetation, the country here possesses a distinct beauty and attraction of its own.

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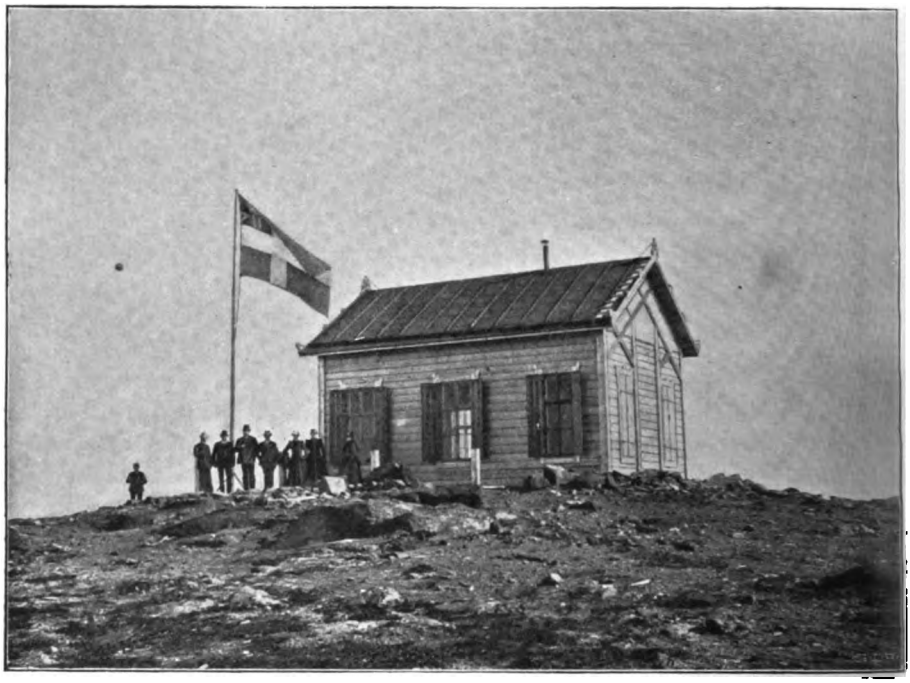

Tourist Hut on Mt. Dundret, Gellivare.
After a photo taken by the Midnight Sun.

It was the construction of the two trunk lines from Stockholm to Norrland during the course of the last few decades that first brought that northern section of the country, embraced under the two last headings above, within reach of the more thickly populated parts of Southern Sweden, and thereby awoke to life an interest and enthusiasm for tours in search of recreation and scenes of natural beauty and novelty within the bounds of Sweden itself.

The discovery of the great resources that Northern Sweden was possessed of in this regard, and of which the majority of Swedes up to that time had no idea whatever, gave the first impetus to the founding of the **Swedish Touring Club,** which took place in 1885, the actual originators being some students at Uppsala. In 1887, the club's headquarters were placed in Stockholm, and since that date the club has been the prime mover in the opening up of Sweden as a resort for tourists, be they Swedes or be they foreigners.

The programme this club has placed before itself is considerably more far-reaching than those of the majority of Alpine or Touring Clubs in other parts of the world. In the first place, the association has devoted great energy to the task of disseminating among the dwellers in Sweden itself a knowledge of their country and has sought to arouse people's interest in the study of that country's physical features and the life of its inhabitants. To this end, the club issues a well illustrated Annual, containing descriptions of scenes and life in various parts, it makes a grant of money out of its fund to stimulate such scientific research as bears upon the objects the club has in view, gives also

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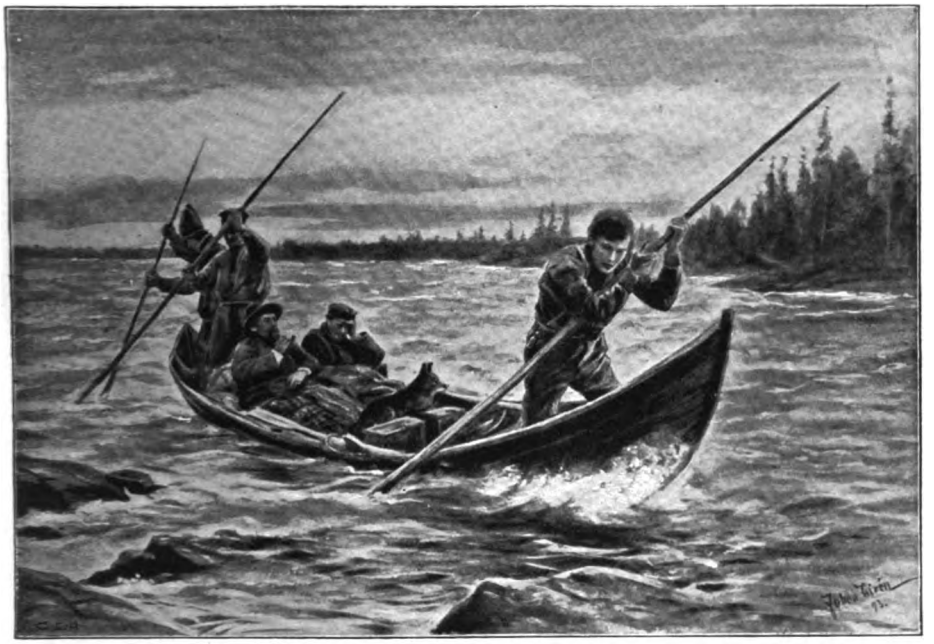
pecuniary support to a large number of both secondary and common schools, every year, for the encouragement of walking excursions in summer time on the part of the scholars and, finally, arranges for lectures to be held and collections to be exhibited, etc. Furthermore, the club has instituted a very extensive collection of photographic views and in conjunction therewith has organized a number of photographic competitions. In order to facilitate traveling about in the picturesque and distant parts of the country, the club has not only had a reliable and detailed Guide-book prepared, but has also secured other coveniences in the shape of a number of Tourist Huts that have been erected in the mountainous districts, quite a fleet of boats on the Lappland lakes, roads constructed, authorized guides appointed, reforms effected in the hotel system and routes of communication, besides discounts fixed in certain districts on fares, hotel bills, etc., for its own members.



Against the Rapids.
Picture by JOHAN TIRÉN.

By reason, too, of the importance for the country of tourists from *foreign* countries having their attention directed to the advantages that Sweden offers as a tourist resort, the association has devoted forethought to this subject, and has, to a very appreciable degree, succeeded in achieving the desired result, by sending out for distribution in foreign countries a large number of publications dealing with Sweden as a land worthy of visiting, by causing newspaper articles to appear in foreign journals, and by means of lectures, exhibitions, etc.

The association, which is under the patronage of His Majesty the King of Sweden and has repeatedly been the recipient of a subsidy from government funds, has made such progress that its membership at present numbers upwards of 30,000, while some 500 of these are its accredited agents or commissioners. By force of the example this national association has set, *Local touring clubs* have come into existence up and down the country, which, for the most part, are engaged in working for the interests of their own localities as tourist resorts.

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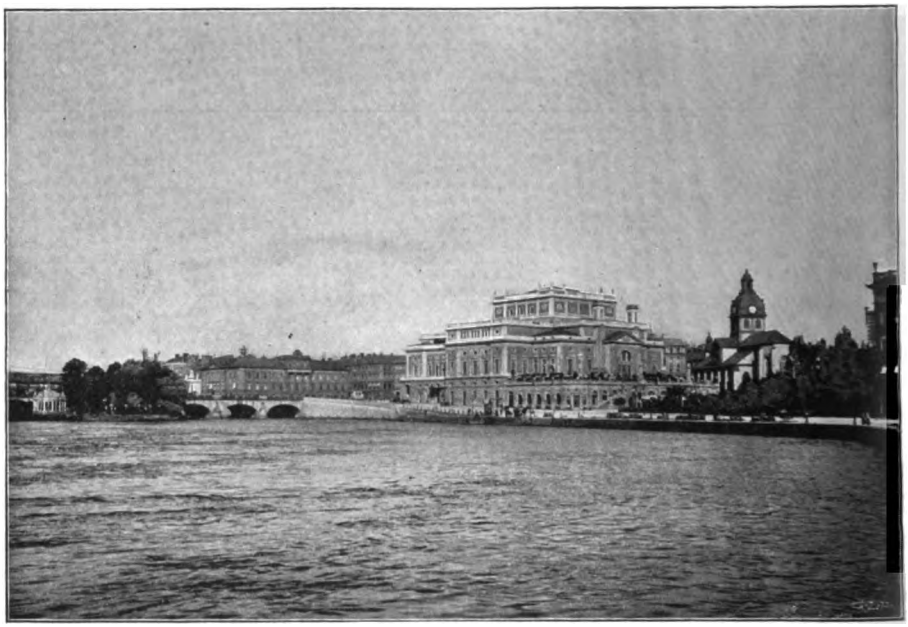
Of those places and **tourist routes** which have established themselves in the favour of the traveling public in Sweden the following may be mentioned:

1) *Stockholm*, the capital of the country, famous not only for its beautiful situation but also for the well-nigh innumerable excursions of great interest that can be made in its surroundings. On the one side there lies Lake Mälaren, studded with a myriad of islands of great natural beauty, enlivened by numerous stately mansions, some of which owe their foundation to the heroes of the Thirty Years' War, others again being of modern date, and made further interesting by abundant relics of ancient times. On the other side are the multitudinous islands (The »Skärgård») of a rugged and bold character, that gird the Baltic coast and dot the estuary that forms the waterway to Stockholm from without.



The River Norrström, in Stockholm. Photo. BENGT ORLING, Stockholm.

These clusters or fringes of islands form a highly desirable resort for the yachtsmen of the capital in summer time; Sandhamn, a pilot station on the margin of the Baltic itself, is their chief rendezvous. In the adjacent waters annual regattas are held. Exhibitions of swimming and other branches of aquatic sports are frequently given during the season at the public baths in Stockholm and attract a good deal of attention on the part of tourists in the city. Canoeing may also be practised in the vicinity of Stockholm to great advantage, as is indeed the case almost everywhere in Sweden, a land so richly endowed by Nature with lakes and waterways. Winter sports are also carried on with great enthusiasm in the capital and its neighbourhood, competitions on »skids», skates, etc. of various descriptions being frequently arranged. (On this topic, consult the article below: Sport).

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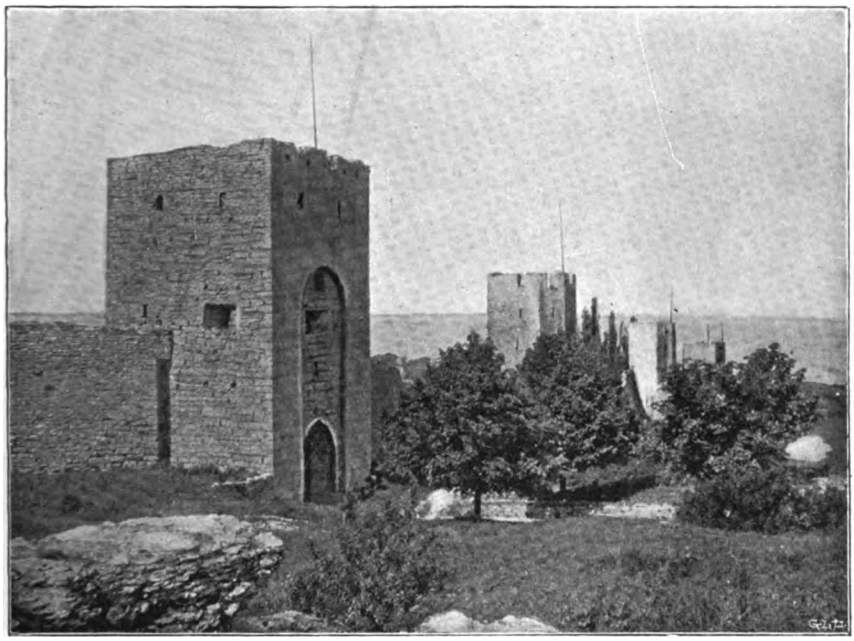
Places of interest somewhat further afield, but still of easy access from Stockholm are: *Uppsala*, the famous and ancient seat of learning, *Elfkarleby Waterfalls* in Dalelfven River with salmon-fisheries, and

2) *The Island of Gotland.* Visby, the chief place of the island, was one of the Hanseatic towns and is now a tourist resort of the first order, being distinguished for its picturesque blending of the gloomy and grand impressiveness of its monumental ruins, telling of its former greatness, and the peaceful and idyllic invitingness of the simple edifices and fragrant rose gardens characterizing the little provincial town of modern times. The proximity of the ever-changing and never-resting sea lends a further charm to the quaint town. The interior of Gotland also deserves to be seen and known.



Portion of the Visby Town Wall. Photo. K. SIDENBLADH j:r.

3) *Gothenburg and the West Coast of Sweden.* The West Coast, especially north of the city of Gothenburg, exercises great attraction upon Swedes by reason of its numerous enticing watering-places, chief of which are *Marstrand* and *Lysekil.* Marstrand is a little town at the foot of Karlsten, a fortress formerly of considerable importance but now dismantled; King Oscar spends a portion of every summer at Marstrand. The West Coast watering-places afford visitors ample facilities for indulging in sailing and sea-fishing. — The famous Trollhättan Falls are within easy reach of Gothenburg.

4) *Gothenburg—Stockholm via the Göta Canal.* This three days' trip takes the tourist across portions of three great lakes, Venern, Vettern, and Mälaren, past the Falls of Trollhättan and the pretty scenery around Mt. Kinnekulle; it well repays the time spent upon it. Several of the smaller towns in Central Sweden are called at. The country through which the canal passes is as a whole more typical and more picturesque and inviting than is that along the routes of the trunk railway lines.

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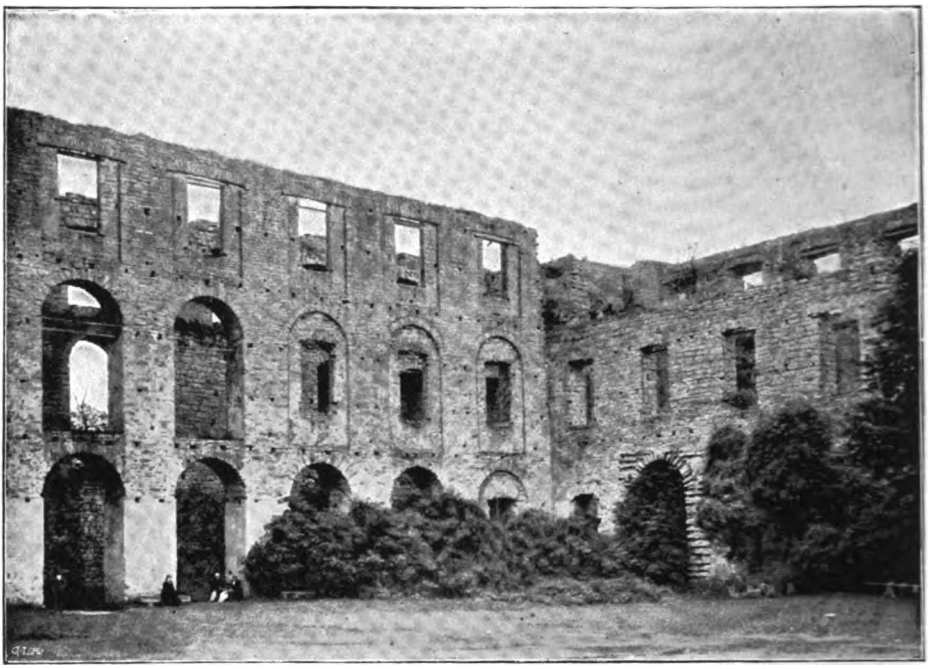

Ruins of Borgholm Castle, Öland. Photo. Fr. G. Klemming, Stockholm.

5) *Gothenburg—Stockholm by steamer round the coast.* This steamer-trip is of considerable interest, affording, as it does, opportunities of making acquaintance with the »Skärgårdar» and with numbers of coast towns, such as Malmö, a flourishing port and centre of industry in direct communication (by ferry) with Copenhagen; Ronneby, a health resort far famed for the quality of its mineral springs and baths; and Karlskrona, the chief naval station of the kingdom.

6) *Gothenburg—Stockholm via Lake Vettern.* Instead of traveling direct to Stockholm by the trunk railway, it is possible to make a slight détour in order to see the beautiful scenery round Lake Vettern en route. Leaving Gothenburg by the State railway to Stockholm, the tourist changes trains at Falköping-Ranten and proceeds on a branch line to Jönköping. From there steamboats ply to Grenna, Visingsö, and Motala, whence by train again to Stockholm. Visingsö and the shores of Lake Vettern north of Grenna and Hjo are excellent for cycling. Hjo is a little watering-place on the western shore of the lake.

7) *Dalarne* (Dalecarlia). In this province, famous for its natural beauty, its eventful history, and the preservation of many of its characteristic and peculiar customs, there are two large church-villages, Leksand and Rättvik, that afford much of interest to the tourist. At the last-named, accommodation of excellent character is now provided at two tourist hotels. A tour in the province should be arranged to include a Sunday at one or other of the two places mentioned, so as to admit of the collecting of the peasantry at church being witnessed.

8) *Jemtland.* This province is traversed by the trunk railway line uniting Stockholm and Drontheim. It is specially noted for a number of magnificent waterfalls (Tännforsen, Storbo, Handöl, and Rista Falls, etc.) and also for its sanatoriums in the mountains, which are resorted to by a great many patients (Åre, Enafors, Storlien, Kolåsen, Bydalen, etc.). Many interesting excursions

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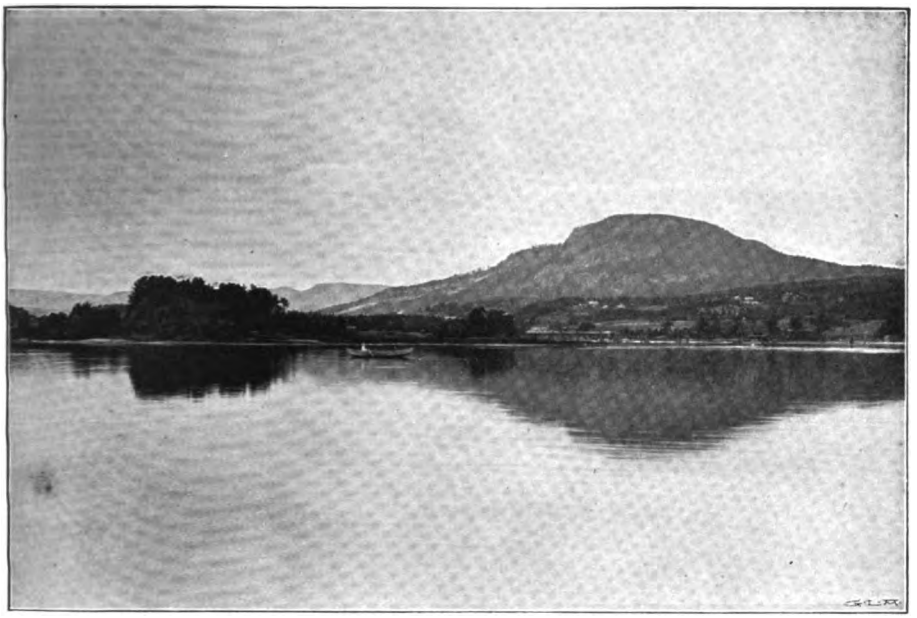
among the mountains can be made, while fishing is to be had in the vicinity of almost all the places named.

9) *The Rivers Indalselfven and Ångermanelfven.* The lower reaches of these rivers present excellent opportunities for the tourist who makes a trip upon them, to obtain an idea of the natural grandeur of the Norrland rivers and also to observe how the timber industry is carried on and how the salmon fishery is conducted. Steamers start from Sundsvall on the Baltic coast and make their way up the Indalselfven to Bispgården, a station on the trunk railway line through Norrland. Other steamers, again, ply up the Ångermanelfven from Hernösand on the Baltic coast to the railway station of Sollefteå. As Sundsvall and Hernösand are in frequent connection with one another by water, and likewise Bispgården and Sollefteå by land, it is easy to combine the two trips on these rivers. They can, moreover, very easily be accomplished in conjunction with a journey to Dalarne or to Jemtland, or with the following tour.



At Lake Torpsjön, in Medelpad.

10) *Northernmost Sweden and Lappland.* The railway line from Stockholm to the far North, and that starting from Luleå, crossing the polar circle and reaching to Gellivare and beyond, have opened up the gateway to the realms of the Midnight Sun, hitherto the home of nomadic tribes of Lapplanders. The line from Luleå has recently (in 1903) been extended all the way to Ofoten on the Atlantic coast. This, the most northerly railway in the world, will certainly be a tourist route of great interest, traversing the very heart of Lappland and skirting the great lake of *Torne träsk.* At present, however, the greater part of Lappland, is only accessible to the pedestrian who carries with him his requisites in the way of food and shelter. With Gellivare as the starting-point, an interesting and comparatively easy excursion, partly on foot partly in rowing boat, can be made to two of the grandest waterfalls in the whole of Europe: the Stora Sjöfallet and Harsprånget. Another interesting Lappland

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tour, not involving a great burden by way of equipment, is the following: Luleå (Baltic coast of Sweden)—Jockmock—Kvickjock—Bodö (Atlantic coast of Norway). The route followed is the valley of the river Luleelf.

The Swedish **Railways** are quite on a level with the best lines on the Continent of Europe. The carriages are roomy and comfortable. The railway officials excel in courtesy and attentiveness. The tip system does not exist. On main lines, sleeping and dining-cars are employed. When no dining-car is on the train, a stop of about 20 minutes' duration is made at some station en route to enable passengers to get a meal. The railway refreshment rooms at such stations are usually very well appointed, and the catering is done in a way to suit the

Near Söderköping, in Östergötland.

convenience of travellers. Everyone is at liberty to help himself to any or all of the numerous (at dinner some seven or eight) dishes, provided on the table, for which a fixed charge is made irrespective of the amount consumed (price for dinner, usually 2 kronor, inclusive of a bottle of ale and a cup of coffee). The scale of prices for tickets on the State railways, which are the principal through lines, are as follows: first class 8·5 öre, second class 6 öre, third class 4 öre per kilom. (resp. 1·8, 1·3, and 0·85 d. per mile) by express trains. For long journeys north of Stockholm there is a tariff based on the principle of reduction of rate for extended distance; thus, a second class ticket from Trelleborg (port at the extreme south of Sweden, in direct mail and passenger communication with Sassnitz, Germany) to Gellivare (north of the arctic circle), i. e., for a distance of over 2,000 kilom. (1,250 miles), costs only 73·90 kronor (about 4 £). — Concerning the recently established luxury-train *Lappland Express*, see the special article on Railways.

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By reason of the great length of the Swedish coastline and the numbers of lakes and canals in the interior of the country, **Steamboats** form a very usual and a very popular means of locomotion. Many steamer routes pass within the belt of islands fringing the coast, and in those waters there is little danger of sea-sickness being occasioned. As a general rule, Swedish steamboats are kept in thoroughly good order, and though not particularly large they are often fitted up with great comfort. The Swedish navigators are deservedly renowned. There is almost always a good refreshment department on board, with prices but little exceeding those of the hotels. The table d'hôte system is customary.

In the large towns and the principal tourist resorts there are to be found good, in some cases really first-class, **hotels**; at other places, too, there is accommodation afforded of a kind to satisfy anyone who is not too exacting and can adapt himself somewhat to the conditions of the country he is in. Rooms are charged in the country districts at 1·50 kronor to 3 kronor each per night. In large towns prices range higher, but good accommodation can usually be obtained for 3 or 4 kronor. Most hotels, besides sleeping accommodation, also provide board, served in the dining-room or the café. (A krona = 1·10 shill. or 0·268 dollar).

The former is used for meals, usually three in the course of the day. *Breakfast*, often a so-called coffee-breakfast (Kaffe-frukost), consisting of bread, butter, eggs, cheese, pickled anchovies or Baltic herrings, and small slices of tongue and other cold meats (price: about 1 krona). If a more substantial meal is desired, or hot meat is preferred, orders can be given from the bill of fare. *Dinner* is usually taken between the hours of 2 and 5, occasionally on the table d'hôte plan but more often à la carte. Dinners at hotels in Sweden generally make an ordinary dinner of two, three, or four courses, with or without »Smörgåsbord« (see p. 155), according to taste. The Smörgåsbord is laid out where all can get access to it, but it is possible to order the same dishes to be served as a preliminary course at the small table where the dinner proper is eaten. The customary drink, except on festive occasions, is beer. It is only at a very few of the more luxurious houses that wine is expected to be taken. *Supper* includes, as a rule, Smörgåsbord and one or two courses, to be ordered from the bill of fare. — The *café* at the best restaurants is often very sumptuously furnished and provided with a band, that plays in the afternoons and evenings; there, those who feel so inclined indulge in coffee after dinner or supper, accompanied or not by liqueurs, according to taste.

The most recently compiled and most detailed **guide-book** for tourists in Sweden is that published by the *Swedish Touring Club*. The Swedish edition is in 4 volumes, but more concise handbooks in one volume have been issued for the use of foreigners in German (second edition) and in English (with Philip and Son, Fleet Str., London), while one in French is in course of preparation. There have also been issued serveral **maps** for tourists, those on a small scale being of unequal merit. Those on a larger scale, indispensable for cyclists and pedestrians, consist of the mapsheets published by the *General Army Staff* on a scale of 1 : 100,000, at a price of 50 öre per sheet, and by the Norrbotten Map Department, on a scale of 1 : 200,000, sold at 1 krona per sheet.

Sport (Idrott).

Idrott (sport) is an old Swedish word, evidencing that sports were in vogue amongst our people from time immemorial. In ancient times, the Viking traveling from place to place conquering and colonizing — attracted the attention of the world by his physical beauty, his vigour and his sagacity. It was a custom with the inhabitants of the

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North to perfect themselves in strength, suppleness of limbs, and courage, just as the culture of the mind was promoted by exercise in the art of poetry and in jurisprudence. Their principal sports consisted of *racing*, either with or without armour; different kinds of *running* and *leaping*; *wrestling*; *tug-of-war* and other contests and trials of strength; *skid-running*, *skating*, *swimming*, *riding*, *spear-throwing*, *archery* as well as *fencing* with sword and shield. Besides these, there were many *throwing* and *running games*, principally *at balls*. *Hunting* and *fishing* were also highly esteemed, not only as means of livelihood but also as a sport, when it was the question about managing one's way in the woods, in the field, and on the water. The sea-faring Northener's being a great sportsman and warrior is attested not only by the history of the North, but also by that of several other countries.

Winter Day at Rättvik, Dalarne. Photo. O. SUNDBERG, Hedemora.

These sports are thus almost the same as those which have remained practically unaltered through the centuries down to our days, and we may therefore judge that the Scandinavians of olden times had, by means of sport, attained the height of physical development. That those Scandinavians who for centuries colonized England, brought over with them their games and sports is beyond question, and thus they have contributed towards the founding of English sports, amongst which the athletic exercises mentioned above are to be numbered.

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Sport has always been held in great honour by the inhabitants of Sweden. About the middle of last century, however, it was by no means in a flourishing state, and the Swedish national games were on the point of utterly dying out. But new life has been infused into Swedish sport by the recently awakened spirit which has spread itself over the country during the last ten years, and has, moreover, been influenced by the enormous sport interest characterizing our days. Swedish sport has thus naturally acquired a more modern stamp, even though some branches of sport, being purely national, have preserved their original northern character; this is especially the case with the winter sports.

Skate-sailing at Saltsjöbaden, near Stockholm.

Winter sport, by which we mean exercises dependent on ice or snow for their pursuit, has never shown any token of dying out in our country, even though the graphic curb presents descending as well as ascending lines. This kind of sport has always been thoroughly national and independent. By means of contests and careful attention it has, however, also developed to a pitch of perfection hitherto unknown.

Skating is the sport most in vogue in the country; thanks to Sweden's great expanse of water, it is so popular that without exaggeration it may be said that nearly everybody can skate. Skating has of late years become as general amongst women as amongst men. Even among country folk skating is quite a common thing, partly as an entertaining pastime, partly as a practical means of quick traveling over the numerous fiords. Swedish skaters have won recognition and distinction even abroad, and at the present moment Swedes hold

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the two figure-skating championships, inasmuch as that of Europe, as also that of the World, have, at the international contests arranged by the International Skating Society, been carried by Swedes. This society — embracing fourteen countries — is conducted from Sweden, which provides the chairman and the secretary. In speed skating, Sweden has also produced many good champions, who have secured the first prizes at the international races abroad. *Stockholms allmänna skridskoklubb* (skating club) was the one to take the lead in this department. Of late years, a very great number of skating clubs have arisen in Sweden, and in most of the larger towns we find either natural or artificial skating rinks.

Skid-running — without doubt the grandest sport in existence — had lost ground in Sweden in the sixties and seventies and was practically seldom seen south of Dalelfven. In the northern districts, on the contrary, skid-running has always been in the vanguard of sports as a useful method of swift locomotion, and magnificent feats have occasionally been accomplished by the hardy inhabitants of those regions. In consequence of the newly roused sporting interest everywhere in the country, this so-called »sport of sports» has become famous wherever there is snow. The rising generation now assiduously practises skid-running, which has attained such popularity among old and young, men and women, that it bids fair to put every other winter sport in the shade. Also here, the stir brought about by racing has been productive of more general practice and a higher development. *Föreningen för skidlöpningens främjande i Sverige* (the Society for promotion of skid-running in Sweden) — a remarkably energetic society — has brought this branch of sport to the front by arranging contests in different parts of the country and by appointing instructors to teach the young. This society, moreover, issues a valuable Annual. More than a hundred skid-running matches take place every year, and as many as thirty clubs flourish in Sweden.

Skid-running — which has for its object locomotion everywhere, in woods and fields, over ice and meadow, up and down slopes and fells — has two characteristic features: *distance* or *despatch running*, and *hill-skidding with jumping*. In both, separate matches are arranged; sometimes in the two together. On hilly ground more than twenty meters have been covered at one jump, and people speak of a jump of even thirty meters down a considerable ledge.

Another winter sport affording great pleasure to its votaries and being a peculiar sight to watch, is **Skate-sailing.** During the last decades, this has likewise developed itself into a veritable sport with highly interesting races, at which beating to windward and sailing with side-wind and leading wind are occurring. On the fiords round Stockholm, when the ice is smooth, you can revel in the sight of the beautiful picture presented by some thirty white sails chasing each other with astounding velocity. At one occasion when the wind was high, the speed was tested by the log to be 50 knots (93 kilometers an hour).

Ice-yachting is practised, though not so much, because the ice, as a rule, is covered with snow; and in cases of thaw or winters without snow, it is more convenient, more independent, and less expensive to go in for skate-sailing.

Sledge-kicking is a regular Swedish winter sport, which was originally a practical means of communication along the country roads; it is, however, now so common amongst the young people of Norrland that the »Sparkstötting» (kick-sledge) forms part of the winter equipment. It is, as it were, the winter bicycle, and on roads hard worn down, during sharp frost, or across ice when the snow is not too deep, a good speed can be attained. Also in favour of this sport, clubs have been organized and matches arranged.

Tobogganing has also been developed into a sport by the throwing up of ice-hills, one of which is kept up by *Föreningen för befrämjande af skolungdomens fria lekar* (the Society for the promotion of outdoor sports for the Young), at Humlegården in Stockholm, where, on school holidays, toboggans can be reckoned

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by thousands. Grown-up people, too, of both sexes, give themselves up to tobogganing, which is a very ancient winter sport highly favoured by society. The toboggan-hill at the Stockholm Sport Park, as well as the one of Djursholm and of Saltsjöbaden, in the vicinity of Stockholm, is largely frequented by crowds of young people.

Harbour at Sandhamn. Boats of the Royal Swedish Yachting Club.

Summer sports. Among such sports, the oldest and the most national is **sailing;** it dates back to the times of the Vikings. Our sea-washed, tideless coasts and our great inland waters offer splendid opportunities for a sport so generally liked. Sailing clubs exist all over the country and, where none exist, sailing is nevertheless carried on. The love of boats and of water is inherent in Swedish character. Sailing has developed to an unheard-of extent during the last decade. *Kungl. Svenska segelsällskapet* (the Royal Swedish Yachting Club), which has its head quarter in Stockholm, is the largest Sailing club in the world, both as to number of members and of boats. Skill in boat-designing and boat-building has increased in the same degree as a more powerful spirit of sport has got a footing with our sailers, and the races consequently have increased in number and vigour. For our conditions, the activity in boat-building is immense in Sweden. A whole staff of skilful designers has arisen, and the Swedish yachts which have won prizes on the race-course, have become articles of export much in demand. Our yacht constructors have carried off the prize at international matches in mechanical drawing. National and international sailing-matches take place throughout summer, everywhere in the country. The Royal Swedish Yachting Club's week has become a kind of national festivity. International Challenge cups form the objects of competition at annual, interesting sailing-matches.

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The sailing club next in importance to that mentioned above is *Göteborgs Kungl. segelsällskap* (the Gothenburg Royal Yachting Club), which has also a very grand racing-week.

No country is more suitable for **rowing** and **canoeing** than Sweden. The English have termed Sweden »the Paradise of canoeists». These sports are pretty actively pursued, and rowing clubs are found in most of the large towns. The boats used consist, as a rule, of racing outriggers of English type; on the coast, however, ordinary gigs are used besides. Annual boat-races are held pretty nearly everywhere, and, in the Sound, the Scanian rowing clubs have maintained their reputation by carrying off the Sound Challenge Cup, presented to the Danish and Swedish rowing clubs. The Stockholm Rowing Club had, in its day, crews that were considered invincible. These races, too, have in many places developed into national sport festivals.

Amongst summer sports, **swimming**, however, may be said to be the most practised, and in this kind of sport Swedes hold a distinguished place, especially as regards jumping and leaping into the water, floating, and diving. Swedish swimmers have highly distinguished themselves at swimming matches abroad, especially in London, 1897, and in Paris, 1900, when their beautiful »swan-dive» was much admired, and termed unequaled in its kind. Expertness in swimming is pretty general amongst educated people of both sexes, and our abundance of lakes offers admirable opportunities for exercise in the art. Swimming and diving-matches are annually arranged in Stockholm, and it is chiefly in the capital that the art of swimming has reached such a high standard of development. There are, however, swimming clubs in many places, of which the oldest — in Uppsala — is more than one hundred years of age.

For so-called **general athletic sports** — comprising pedestrianism (with its various phases of walking and running), leaping, wrestling, throwing the spear, tug-of-war, etc. — a number of clubs have been organized in the country, and Swedish sportsmen have successfully taken part in matches within Scandinavia. Annual athletic fêtes are arranged in many parts of the country. Some purely Swedish exercises in trials of strength and hurling fall within this range, e. g. the Gotland games of »*Kasta varpa*» and »*Störta stång*», the latter of which is identical with the popular Scotch sport of »tossing the caber».

Of **games at ball** there are several national varieties of great value, amongst these the principal one — Gotland *Pärk* — can be said to stand its ground at the side of English cricket. *Football* is practised in many places, especially by the military. *Lawn-tennis* has become a very popular game in Sweden, and many clubs have been formed for the practice of it, amongst which H. R. H. the Crownprince's Club is distinguished for its clever players. Annual matches are arranged by this club.

Bicycling has, in Sweden as everywhere else in the civilized world, become the sport most generally practised, and the Swedish make of machines successfully competes with the foreign ones. A number of bicycle clubs exist. Annual matches are arranged, and excellent tracks have been laid out.

Athletic Grounds have been inclosed in many places, for the purpose of gathering together young people to the practice of sports. The chief in its kind is the Sport Park (*Idrottsparken*) at Stockholm, the laying out of which cost 10,000 £. It includes a stately building for lawn-tennis, with two large courts, as well as a larger and a smaller pavilion for bicyclists. A first-class cycle track of cement encircles four tennis-courts, race-courses, etc. In winter this enclosure is changed into an excellent and much frequented skating-rink. A similar sport park has just been laid out at Djursholm, near Stockholm. Gothenburg, Malmö, Lund, Landskrona, and Helsingborg, each have their athletic grounds, and several other towns are considering the advisability of following the example.

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Hunting and **shooting** are two closely related branches of sport. Hunting has, at all times, been a national sport, pursued generally and everywhere in the country, originally as a profession, now almost exclusively as a sport. The royal elk-hunts on Hunneberg in Vestergötland are, perhaps, the principal deer hunts in Europe; on these occasions, some fifty of these stately animals will, at times, bite the ground. H. M. the King's Hunting Club is the chief of the kind in the country. Hundreds of first-class hunting parties are annually held, all over Sweden.

For the promoting of shooting — important from the national defence point of view — a number of shooting clubs, enjoying State support, have been organized. *Svenska jägarförbundet* (the hunters' association), with head quarter in Stockholm and branches in the province, practises rifleshooting from a hunting point of view. Everywhere, shooting-matches are held, and the State provides means for the prizes. *Göteborgs skyttegille* (the Gothenburg Shooting Club) has presented a valuable Challenge cup, which is annually competed for by group-shooting. Also for schoolboys, shooting-matches are arranged, amongst which the one annually held in Stockholm is the principal.

Playing at the Game of Pärk, outside Visby.

Riding, as a sport, has chiefly been exercised by professional riders, i. e. cavalry officers. Of late years, during which a special Racing Club, a Jockey Club, and several Cross-country Clubs have been formed, riding has come to be more generally practised also by civilians and ladies. Excellent race-courses have been laid out, and races are held annually at many places in the country. Hunt-rides, steeplechases, hurdleraces, despatch rides, »following the hounds», and cross-country riding of different kinds are arranged by the cross-country clubs, and riding has taken a more practical turn by cross-country riding having received attention at the side of manège riding, formerly more exclusively practised.

Trotting races certainly occur, and begin to get considerable development. Several trotting clubs exist, which arrange competitions mostly in winter, on the ice.

The Northern Games (Nordiska spelen) have been instituted on the model of the Olympian Games of Ancient Greece. Just as they derived their vitality and vigorous existence from the noble purpose that inspired them, of gathering together exponents of athletic skill from among the highly civilized peoples of that day to take part in national championship contests, so these modern games owe their conception to a desire of assembling at periodic meetings the modern nations' most brilliant representatives in the domain of winter sports, there to try their skill, and thereby to stimulate the love of and devotion to

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health-giving and exhilarating pastimes in ever widening circles of the population. To Sweden belongs the honour of having originated the Northern Games. The programme as originally projected was a comprehensive one, viz. to give an adequate picture of the very numerous forms of sports and games now practised in Scandinavia during winter, and to afford an exhibition of those qualities of hardihood and determination which the practice of winter sports specially cultivates. The season chosen for the proposed international athletic meetings was winter, inasmuch as it is then that Scandinavian sports chiefly flourish.

The first occasion on which the idea of holding Northern Games could be realized was in February 1901, with rendezvous at **Stockholm.** The result was extremely gratifying to the promoters, for the meeting, extending over 9 days, proved a great success and presented features of exceeding interest to all lovers of athletics. The number of competitors from the three Scandinavian countries and from Finland was very large, while Germany, Austria, Holland, and England were also represented in the competitions in such sports as climatic conditions in those countries admit of being practised by their inhabitants.

The public in general, not only in the capital but also in the provinces, eagerly followed the progress of the competitions; the number of spectators was large, and the keen interest they took in the proceedings brought them into touch with the competitors, whereby a genuinely popular and national character was given to the meeting as a whole. As stated above, the contests were continued day after day for no less than nine days. No alteration had to be made in the programme drawn up, its very numerous items being successfully carried out, irrespective of the weather prevailing or of any other circumstance.

Scandinavian sports and pastimes were on this occassion placed in evidence in a way never before thought of, much less realized. The following is a list of the contests and exhibitions embraced in the programme of the meeting.

a) *Skating.* Figure-skating; Speed-skating, including two world-championships, one carried off by a Swede, the other by a Finn. — b) *Skid-running.* Flat races over distances of 30 kilometers, 60 kilometers, and even of 255 kilometers, the latter being a bidstick race; the bidstick was conveyed the whole distance from Falun to Stockholm in three sections, sets of three messengers, one for each section, competing for the prize; the winning three covered the 255 kilometers in 19 hours 38 minutes. The competition in skid-jumping produced some magnificent performances. — c) *Races on horseback*, now in snow-storm, now in sunshine, now with the thermometer 10—20 degrees below zero (Celsius), and with deep snow on the ground. These were among the finest items on the programme of the meeting. The competitors were exclusively Swedes, for the most part officers in the army. They displayed admirable endurance, courage, and confidence. The contests included a flat race, a steeplechase, and »following the hounds». — d) *Skid-driving with horses.* This was a novelty and it was executed both in the form of an 80 kilometer race between a number of competitors, themselves on skids but each drawn by a horse which he had to drive, and in that of a military exhibition, where a company of infantry men on skids were drawn along by a company of cavalry men. — e) *Skid-driving with reindeer.* — f) *Trotting-matches on the ice.* These afforded a picture of genuine Scandinavian life and surroundings. — g) *Kick-sledge-driving with horses.* This was another of the novelties of the programme. — h) *Kick-sledge contests.* The Kick-sledge, consisting of a chair on very long runners, is propelled by a person standing behind the chair and kicking with a spike-shod boot on the frozen surface of snow on the roads. It is very common in Norrland as a means of locomotion. — i) *Ice-yachting and Skate-sailing.* Despite a thick coating of snow on the sheet of ice set apart for these contests, they were pushed through, a special gang of

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workmen being chartered to remove by the aid of snow-ploughs the incommoding covering. — k) *Hockey and Curling-Matches and Exhibitions.*

On two evenings during the meeting, performances embracing Swedish gymnastics, fencing, Swedish country dances, Swedish choir-singing, and Scandinavian music, were given at the Royal Opera House, by amateurs exclusively. On two other evenings, international fencing-matches were held. Sleighing excursions were also organized in the evenings, when hundreds of sleighs would drive abreast across the ice, causing it to ring again. The general effect of these unique drives in the darkness of a Scandinavian winter evening was heightened by the rows of flaring tar-barrels stationed on the boundaries of the course. Torchlight processions of persons on skids, illuminations and fireworks at the skating-rinks and at the open-air Museum of Skansen; besides preliminary and concluding banquets, occupied the remaining evenings. Lastly, it should be mentioned that a trip on an ice-breaker out towards the Baltic was arranged, and an insight into the art of fishing through ice was combined therewith.

Northern Games are intended to be held every other year, with rendezvous alternating between Stockholm and Christiania; hence, once every four years in Stockholm. The games are, it will be seen, to be Scandinavian in the sense of being held in the Scandinavian peninsula, but other nations will be invited to send their champions to compete for the prizes and honours awarded.

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7. PUBLIC COLLECTIONS AND INSTITUTIONS FOR SCIENCE AND ART. PERIODICAL LITERATURE.

Academies and Learned Societies.

The Swedish Academy was founded by Gustavus III, March 20, 1786, on the model of the French Academy. Its purpose is »to work for the purity, strength, and ennoblement of the Swedish language». The King is the patron of the Academy and appoints its members after their nomination by the Academy itself. The number of the members is eighteen, among whom are also the three officials of the Academy, the director (chairman) and the chancellor (vice-chairman), elected every half year, and the secretary, who is permanently appointed and should be resident in Stockholm. The anniversary of the Academy is on Dec. 20 (the birthday of Gustavus Adolphus). Its main source of income is the publication of Post- och Inrikes Tidningar, the official organ of Sweden. Out of the public funds the Academy annually receives 8,250 kronor, of which 6,000 are intended as support for literary authors. — The Academy annually awards one of the five Nobel prizes (cf. page 379).

The Royal Academy of Sciences was founded in 1739 by a private society, among whose members was Karl von Linné (Linnæus). Its statutes were sanctioned by the Government. Its object is the promotion of natural sciences. The Academy publishes the almanacs and the State

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Calendar, on which publications it has a monopoly, and which constitute its principal source of income (more than 90,000 kronor per annum; a krona = 1·10 shill.). Out of the public funds, the Academy has an annual subsidy of nigh to 14,000 kronor; its own funds (not including those simply administered by the Academy) amounted at the end of 1900 to a principal of 1,211,500 kronor. The Academy consists of 100 Swedish and Norwegian and 75 foreign members, who are all elected by the Academy itself.

The former are divided into nine classes; the first for pure mathematics, with 6 members; the second for applied mathematics, with 6 members; the third for practical mechanics, with 8 members; the fourth for physical science, with 6 members; the fifth for chemistry, geology, and mineralogy, with 12 members; the sixth for botany and zoology, with 16 members; the seventh for medical sciences, with 15 members; the eighth for technical, economical, and statistical sciences, with 15 members; and the ninth for science and learned professions in general, with 16 members. From the first up to the eighth class, the number of foreign members is equal to that of home members; the eighth has only 6; and in the ninth class no foreign members are admitted. — A new division has recently been adopted and presented to the King for confirmation.

The chairman of the Academy, called »Præses», is annually elected by the members. The scientific officials of the Academy are: a secretary; an astronomer, who is also director of the Astronomical observatory; a chemist (at present vacant); a physicist; a director of the botanical gardens (the so-called Bergian Gardens); and a librarian. Under the supervision of the Royal Academy of Sciences stand the *National Museum of Natural History* (cf. page 385) and the *Meteorological Central Office;* the latter has an annual subvention of 25,000 kronor. — This Academy awards two of the Nobel prizes (cf. page 379).

The Royal Academy of Literature, History, and Antiquities was founded by Gustavus III in 1786, simultaneously with the Swedish Academy. Its object is to promote the study of history, archeology, and numismatics, to exercise paramount supervision over the archeological remains of the country, and to inspect designs for medals and for public inscriptions.

The Academy is composed of at most 10 honorary members, 25 active members, at the utmost 20 foreign members, divided into two classes (one historical and one archeological-numismatical), and correspondents to an indefinite number, all of whom are elected by the Academy. The officials are the secretary, who is also State Antiquary, and three amanuenses. The State subvention of the Academy was 29,450 kronor in 1900, while the funds of the Academy were 690,000 kronor for the same year, mostly accruing from donations.

The Royal Academy of Agriculture was founded December 26, 1811. The Academy is composed of a director and 24 honorary members, who are appointed by the Government after being first proposed by the

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Academy; at most 150 active members, and at the utmost 75 foreign members, elected by the Academy. Among the active members, at least 36 must reside in Stockholm or its vicinity. They are placed by the Academy on six divisions, viz.: the agricultural division, with 10 members; the forest and horticultural division, with 4 members; the economic and sloyd division, with 6 members; the mechanical division (for buildings, utensils, and machinery), with 4 members; the scientific division, with 6 members; and the statistical division, with 6 members. — Propositions regarding reorganization is at present under discussion.

In each division one of the members is a reporting one for matters concerning his division. Together with the director, the secretary, and the treasurer, these six reporting members form the administrative committee of the Academy. The Academy, which has funds amounting at the end of 1901 to about 575,000 kronor totally, has, besides, an annual subvention of nigh to 44,000 kronor.

The Academy has at its disposal a piece of land just outside Stockholm, used as a *Field for agricultural experiments* (Experimentalfältet) and, moreover, under its supervision there stands an *Agricultural-chemical* and a *Phyto-physiological experimental institution.* The officials here employed are: an agricultural chemist, with an assistant; a phytophysiologist; a chief gardener; and a land-steward division.

The Royal Academy of Arts was founded March 21, 1735 by K. G. Tessin. The Academy consists of a chancellor, if so ordained by the Government, of royal honorary members, at most 12 other Swedish honorary members, and at the most 50 Swedish members, besides foreign honorary members and members to an indefinite number, all of whom are elected by the Academy. Its officials are the præses and the vice præses, a treasurer, and a librarian elected for a term of three years, and a secretary, nominated for a year, after which time he may be elected for a permanency. Under the supervision of the Academy, there are Schools of Painting and Sculpture for both male and female pupils and a School of Architecture for males only. All instruction is free of charge. The annual grant to the Academy in 1900 was 65,400 kronor; while it has funds of its own to about 290,000 kronor.

The Royal Military Academy was founded on November 12, 1796. The Academy consists of home (= Swedish and Norwegian) and foreign members, the latter to an indefinite number, all of whom are elected by the Academy. The home members are divided into two classes. An officer who, in Swedish or Norwegian service, has the rank of general or admiral can only be elected member of the first class, besides which a member of the second class, who is promoted to the rank of general or admiral, thereby becomes, without election, a member of the first class. The members of the second class, the number of whom is at the most 120, are placed on six divisions, viz. for the art of war in gene-

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ral, with 40 members; for the science of artillery, with 24 members; for the art of fortification, with 10 members; for the science of naval warfare, with 20 members; for the commissariat, transport and hospital departments, with 16 members; and for the departments of mapping, communication, statistics, and technics, with 10 members.

The Royal Academy of Music was founded by Gustavus III on September 8, 1771. The number of Swedish members is at most 80 men and 20 women, the foreign members at the utmost 50 men and women, who are elected by the Academy. Furthermore, the Academy has a right to elect at the most 50 Swedish men and women as associates. The officials of the Academy are: the president, who is elected for a term of one year at a time; the secretary; the director of the conservatory of the Academy; the treasurer; and the librarian. At the *Conservatory*, which stands under the supervision of the Academy, instruction is given in all the subjects appertaining to a musical education. The regular State subvention of the Academy in 1900 was 51,200 kronor.

Among **other learned societies** we may here mention *The Swedish Society for Anthropology and Geography*, founded in 1873. It consists of both Swedish and Norwegian as well as foreign members and honorary members, and corresponding members (foreigners) besides. The number of members is about 1,000. On the initiative of this Society, in 1880, the *Vega Fund* was collected, so-called in memory of the first circumnavigation of Europe and Asia. This fund now amounts to about 45,000 kronor, and its annual proceeds shall be used partly for a stipend, the Vega Stipend, for the promotion of journeys of research in more unknown regions, and partly for the Vega Medal to be awarded to persons who, in an eminent manner, have promoted geographical research. It has hitherto been awarded to Nordenskiöld (1881), Palander (1882), Stanley (1883), Przevaljskij (1884), Junker (1888), Nansen (1889), Emin Pascha (1890), Sverdrup (1897), Hedin (1898), Schweinfurth (1899), Nathorst (1900), the Duke of Abruzzi (1901), and von Richthofen (1903).

Among other learned societies in the *Capital*, we may mention: The Royal Association for the Publication of Manuscripts in regard to the History of Scandinavia, The Swedish Paleographical Society, The Swedish Archeological Society, The Swedish Historical Society, The Society of Swedish Physicians, The Entomological Society, The Geological Society, The Society of National Economy, and The Numismatical Society. — In the *Provinces* the most important are: The Royal Society of Sciences at Uppsala (our most ancient scientific association, founded as early as 1710 by the Archbishop E. Benzelius); furthermore, The Royal Association for Literary Science, and the Society for Swedish Literature, at Uppsala; The Royal Physiographical Society, in Lund; the Royal Society of Science and Literature, in Gothenburg; and the Royal Naval Society, in Karlskrona.

The Nobel Foundation (Nobelstiftelsen).

The Nobel Foundation, established in pursuance of the will of Dr. *Alfred Nobel*, is one of the most notable of any country or any time.

Alfred Nobel belonged to a family of inventors and financial magnates. His father, *Imanuel Nobel*, born at Gefle (North-Sweden), in 1801, — the inventor of nitro-glycerine and of under-water mines — was an engineering genius

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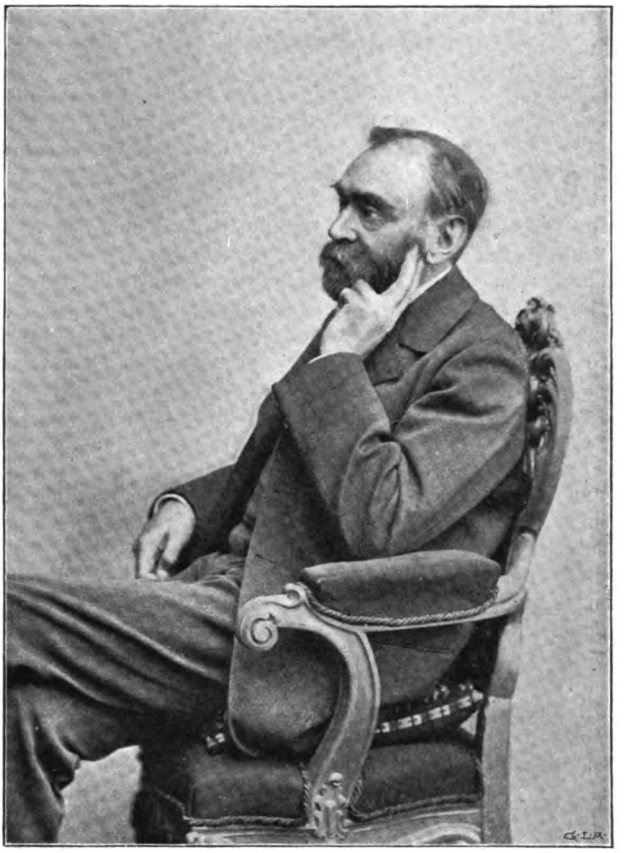
of the first order, and exercised a vast activity both in Sweden and in Russia. Two of his sons, *Robert Hjalmar* and *Ludvig Imanuel*, founded the naphta industry in Baku, one of the greatest and most successful enterprises known to the industrial history of the nineteenth century. A third son, *Alfred Nobel*, who was born in Stockholm in 1833, and died in 1896, was known as the inventor of dynamite; he made himself famous for all time by the great donation which now bears his name.



Alfred Nobel.

Alfred Nobel bequeathed nearly the whole of his fortune (more than 30 million kronor) to a fund, the interest of which shall be annually paid out to those who during the immediate past »have conferred the greatest benefit on mankind» in certain lines. The interest is to be divided into five equal parts to be allotted as follows: »one part to the person who shall have made the greatest discovery or invention in domain of **physics**; one part to the person who shall have made the most important **chemical** discovery or improvement; one part to the person who shall have made the most important discovery in the domain of physiology or **medicine**; one part to the person who shall have produced in the field of **literature** the most distinguished work of an idealistic tendency; and one part to the person who shall have most or best promoted the **fraternity of nations** and the abolition or diminution of standing armies, and the formation and propagation of peace congresses». The prizes in physics and chemistry are awarded by the Academy of Sciences in Stockholm; in physiology and medicine, by the Caroline Institute in Stockholm; in literature, by the Swedish Academy in Stockholm; and for the work of peace, by a committee of five persons nominated by the Norwegian Storthing.

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The statutes of the Nobel Foundation, as also special rules concerning the distribution of the prizes, have been ratified by the Government on June 29, 1900.

In accordance with these, the four above mentioned institutions, as distributors of the prizes, shall appoint, for two years at a time, fifteen *Delegates*, the Academy of Sciences electing six, the other awarding bodies each electing three. The delegates, with whom decision rests concerning reports of audit, for two years running appoint four members of the *Board* of the Foundation, who shall meet in Stockholm and consist of Swedes; a fifth member, who is chairman of the Board, is nominated by Government. The Board, which from its members shall elect a Managing Director, administers the funds and other moneys of the foundation, as also other property belonging to the foundation in so far as it is common to the prize-groups.

For every Swedish prize-group the due authorities who are to distribute the prizes nominate a so-called *Nobel Committee*, consisting of three or five persons, who are to give their opinion anent the distribution of the prize. The corresponding deliberations anent the distribution of the peace prize shall be undertaken by the Nobel Committee appointed by the Storthing. To be chosen member of a Swedish Nobel Committee, it is not necessary to be a Swedish subject, or that the individual elected be a member of the special institution distributing the prize. In the Norwegian Nobel Committee other than Norwegians may also be members. — Where so be deemed necessary, the distributors may appoint an expert or specialist to take part as a member in a Committee.

As aids in the necessary preliminaries, as also otherwise to advance the objects of the foundation, the authorities who have to distribute the prizes, may establish scientific institutions and other organizations, which shall be called *Nobel Institutes*. Foreigners, male or female, may be appointed at these Institutes. Should the distributors of the prizes consider it advisable, the Nobel Institutes shall all be within the same precincts and similarly organized.

The prizes are distributed annually (for the first time 1901) on the high-day of the Foundation, i. e. December 10 (the anniversary of the testator's death). To become a candidate for one of these prizes, it is necessary to be proposed in writing by a person competent thereto. (Applications for receiving a prize, made by the author himself are not considered). The right of proposing a candidate for a prize is held both by Swedish and foreign champions of culture in accordance with minute instructions issued by the corporations charged with adjusting the prizes. — The proposal of a candidate should be accompanied by those works and other documents that are cited. The prize-receiver, if possible, within six months of being awarded the prize on December 10, shall in Stockholm (as regards the prize for peace, in Christiania) give a public lecture on the work having gained the prize. — No work shall be given a prize, unless by experience or expert examination it be deemed of such pre-eminent importance as is plainly indicated by the will. Should no work under consideration be deemed worthy of the prize, the money shall be reserved to the following year. As regards what is to be done, if the prize cannot then be awarded, see below. Within each prize-group, however, the prize must be awarded at least once in every five-year period. — The amount of a prize can be divided between two works. If two or more persons have together produced a work, to which a prize is awarded, the prize is given to all participants in common. Every awarding body has a right to decide the respective prize to be conferred also to institutions and associations.

From the *funds* of the donation, at the commencement of its activity, a sufficient sum for premises for the due administration of the foundation is taken, as also for each group of prizes the sum of 300,000 kronor, for the

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expenses of organizing the Nobel Institutes. From the annual proceeds of the main fund, a tenth part shall be added to the capital; of the remainder, each group shall dispose of one fifth. The sum will of course vary according to rate of interest, etc. At present, each prize-group will annually dispose of an amount of nearly 200,000 kronor. One fourth of this sum will be set aside for the immediate expenses of awarding the prizes and for the Nobel Institute of the group in question. Thus for each of the five prizes there will be about 140,000 à 150,000 kronor.

If a prize cannot be awarded for two years consecutively (see above), the amount of the prize shall be added to the main fund. Three fourths of those taking part in the decision may, however, determine that the sum shall instead be set aside as a *special fund* for the prize-group in question. The proceeds of such a fund may be used — *otherwise than as prizes* — to advance those objects ultimately aimed at by the testator.

It is, naturally, impossible to gauge the future import for science and culture in general of these new institutions thus called into being. In any case, an extraordinary rôle devolves upon *Sweden*, by her being charged with the mission of deciding upon the awarding of prizes of an unprecedented magnitude, in several of the most important spheres of human culture.

Other important legacies for culture.

Here, let us briefly mention some of the most important legacies — of which Sweden has no slight number — in aid of science and culture. (A brief summary of donations for such and other purposes is given at the end of this work).

The Letterstedt Association carries on its work in consequence of donations made by *J. Letterstedt* (1796/1862). Its object is to »further the unity of the three Scandinavian Kingdoms as regards industry, science, and art; and to encourage and assist not only skill in craft, but also to further the development of science and art in these countries». The activity of the Association dates from 1878 and chiefly consists in publishing the »Nordisk Tidskrift» (Northern Magazine), this being a periodical in common for the Scandinavian countries. The amount of the available capital of the Association is about 350,000 kronor; moreover, the donation includes two funds (at present of 80,000 and 340,000 kronor), which are not to be touched, until, by compound interest, the former amounts to half a million, the latter to five million kronor. These sums are all under the *administration* of the Academy of Sciences, annually placing the disposable amount of interest in the hands of the Association, which, in its turn, assigns the sums to the branch associations in Norway and Denmark.

Lars Hierta's Memorial Foundation. This institution, founded in Stockholm, in 1877, by Mrs. *Wilhelmina Hierta* in memory of her late husband, *Lars Hierta* (1801/72), who was a member of the Riksdag and the founder of the independent and liberal press in Sweden, has for its chief aim to bring about and encourage scientific investigations and discoveries as also industrial inventions; to support social improvements; to encourage and impart instruction in trades of general utility; as also everything that can possibly advance the education of the masses in a moral and liberal spirit. The foundation, the capital of which now amounts to about 550,000 kronor, annually disposes of about 25,000 kronor of interest, three fourths of which sum, according to the

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foundation regulations, are distributed by the Board, consisting of five to seven members, the rest being added to the capital. Twice a year (March and November) the distribution of this money is made by grants to such individuals (men and women) as can advance the aims of the foundation. The Board has also the right of taking the initiative itself. Among the establishments founded by the Board, let us mention: The Hygienic Museum at the Caroline Institute in Stockholm, workshops for children, a cookery-school for girls of the working class, the Common school kitchen in the parish of St. Mary in Stockholm, etc. The Board has many times granted traveling expenses for the purpose of obtaining information regarding important institutions or social conditions, such as for instance: to North America in order to obtain information concerning the organization of joint-schools; to England in order to study »The Charity Organization», Octavia Hill's system of workmen's dwellings, the school kitchens, etc.; to France and Germany for studies in bacteriology and several social questions, etc. Moreover, the foundation has given encouragement and pecuniary assistance to a vast number of scientific investigations in the various departments of geology, botany, zoology, physics, chemistry, and hygiene.

The Renström Fund. *Sven Renström* (1794/1869), a merchant of Gothenburg, bequeathed to that community a fund of one million and a half (kronor), of which sum half a million should at once be available for purposes of public good, while the remainder should be left to draw interest. Each time the interest reaches half a million kronor, this sum may be used for the benefit of the community, though not as a direct alleviation of taxes. Thanks to this fund, Gothenburg has already obtained several public institutions of great utility; moreover, grants have been made for several purposes advantageous to the community. Hitherto, the amounts distributed in 1871, 1878, 1885, 1894, and 1903, have altogether reached the sum of 2,650,000 kronor. The Town Council decides regarding the distribution of the money.

Conformable to principles and purposes similar to those of the above-named Renström Fund, have newly been established two other legacies: **The Röhss Fund** of one million and a half, bequeathed to the city of Gothenburg by the merchant *W. Röhss* (1834/1900), and the **Forsgrén Fund** of two million kronor, bequeathed to the city of Stockholm by will of *R. Forsgrén* (1838/1901), merchant in this town.

Längman's Donation. *E. J. Längman* (1779/1863), a Finnish tradesman, in his will left $^{59}/_{90}$ of his property to Sweden and $^{31}/_{90}$ to Finland. The amount bequeathed to Sweden, is divided into three parts, of which »Litera A» shall be used for the assistance of the needy as also otherwise applied to the benefit of the public; »Litera B», for science and art; while »Litera C» shall be applied to improve the Swedish rate of exchange. This last-mentioned fund is, however, not to be used until it has increased to 100 million kronor, and regulations concerning the other two have also hitherto prevented their being touched. The total belonging to Sweden was, at the close of 1902, about 2·70 million kronor. The Swedish Exchequer Department administers the fund.

Archives.

The most important archives of Sweden are found at the **National Record Office** (Riksarkivet), dating from the beginning of the seventeenth century. The object of this institution is to preserve and arrange not only the documents already there, but also those yearly sent in from the Royal Chancery and other Government offices. The Record Office is divided into two sections, the historical and the administrative, the former being divided into two sub-sections.

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Next to the Record Office *the Archives of the »Kammarkollegium»* (cf. page 194) — »Kammararkivet» — possess the most important public collection of manuscripts in the country. They derive their origin from the time of Gustavus I (1523/60), and contain documents and accounts in regard to the taxation, revenues, and other matters of exchequer of inestimable importance to the knowledge of the history of the interior administration and culture of Sweden.

The other central Government offices have their own archives, from which considerable collections of old documents are from time to time handed over to the Record Office. The *Archives of the Central Bureau of Statistics* embrace (from 1860) nominative extracts on the population for each tenth year from the Church Registers, and annual lists (also nominative) of births, deaths, and marriages as well as of immigrants and emigrants. The *Military Archives* consist of hand-drawn and printed maps, marching-routes, plans for fortifications, sieges, and battles, besides documents regarding the military and naval administration. Both the *Royal National Library* in Stockholm and the two *University Libraries* of Uppsala and Lund have considerable collections of manuscripts, which is also the case with several State college libraries.

For the preservation of the archives of the inferior courts and the local State administration, three *Provincial Record Offices* have been founded of late years in Uppsala, Vadstena, and Lund, to which various authorities in the provinces shall deliver all documents bearing dates previous to 1801.

Museums.

A) **Art Museums.** The most important art museum of Sweden, the **National Museum** in Stockholm, may be said to have been originated by the art-loving King Gustavus III (1771/92). The museum consists of three principal sections: a) works of sculpture, and paintings; b) drawings and engravings; c) objects of art-sloyd.

The collection of paintings contained 1,592 numbers in 1900. The sculpture collection at the same time contained 910 numbers; the collection of plaster-casts, 487 numbers; that of antiquities, 1,669; the Egyptological collection, 948; the collection of drawings, 24,210; the collection of engravings, 90,340; and the art-sloyd collection (of ceramic objects, furniture, and products of art-industry) embraced at the same time 10,890 numbers. The total number of visitors amounted in 1900 to 131,814.

Among the museums in the provinces, the Art Section of the *Gothenburg Museum* is the most important, and its collection of modern Swedish paintings is one of the best in Scandinavia. The museum has over 310 paintings in oil and pastel, and 165 pieces of sculpture. Its section for art-industrial and ethnographical objects embraces over 2,700

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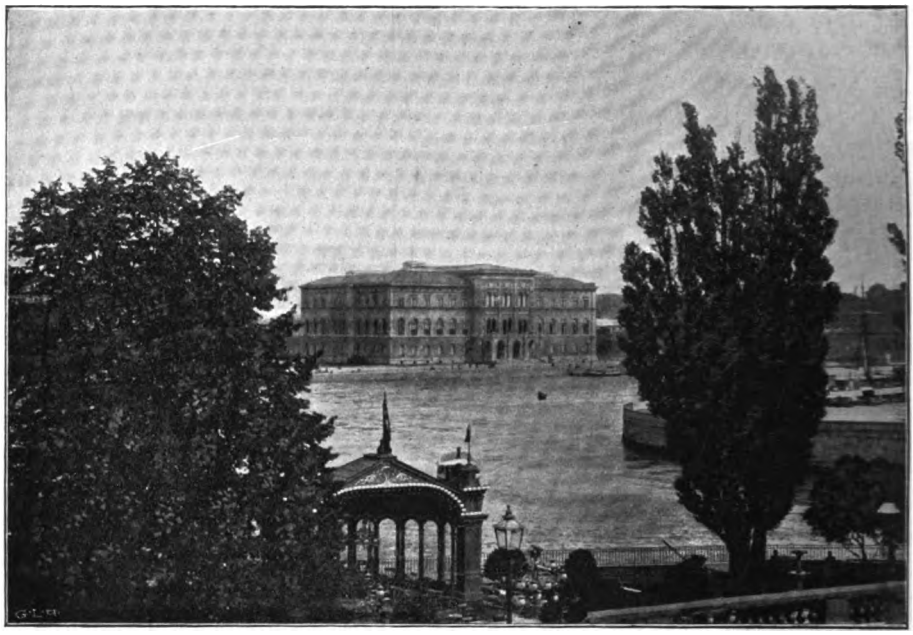
objects of ceramic, glass, and enamel work, furniture, metal, wood, and textile work. Among the other art museums in the provinces, those at the two universities, in Uppsala and Lund, are the most important.



National Museum, Stockholm.

B) **Historical Museums.** The *National Historical Museum* is one of the oldest of its kind, and with respect to richness and scientific arrangement one of the most prominent in Europe. The collections, which principally embrace objects from the three prehistoric periods — the stone age, the bronze age, and the iron age — as well as from the medieval age and later times, are arranged chronologically, and, as far as possible, geographically, within each of the said periods of civilization. In close connection with this museum is the *Royal Coin Cabinet*, which contains, among other things, a very complete collection of Swedish and foreign coins and medals.

The Royal Armoury (Lifrustkammaren). This collection contains nearly 5,800 objects, consisting partly of weapons and fire-arms, and partly armour and garments which have belonged to the royal personages of Sweden from the time of Charles IX (1599/1611) to our own day, embroidered saddles and caparisons, and gala-carriages from the seventeenth and eighteenth centuries.

The Artillery Museum contains at present more than 4,000 numbers, consisting of field and fortification pieces, models of artillery, material

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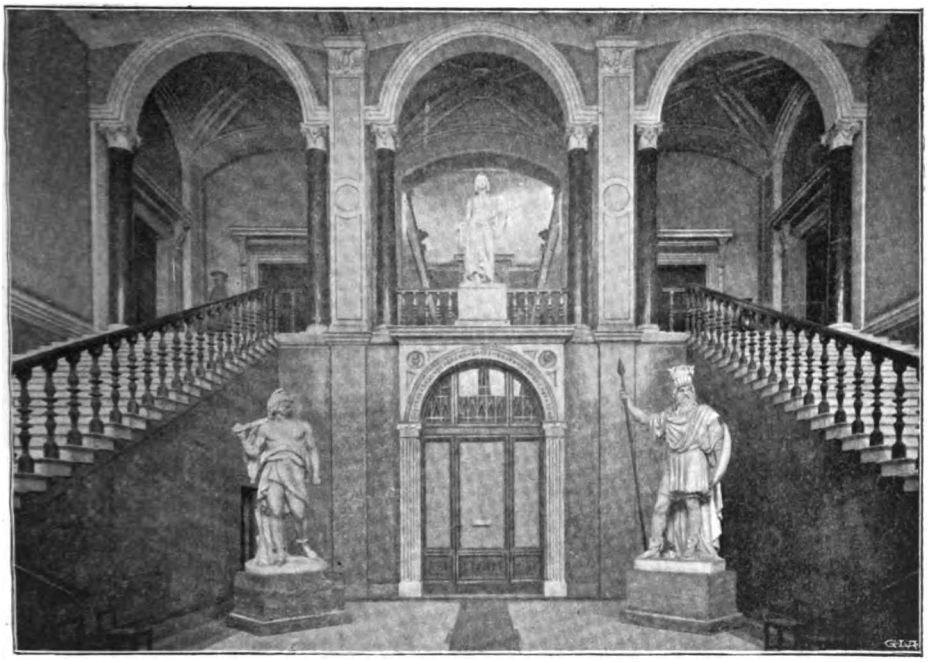
and artillery ammunition, regimental trophies, an almost complete collection of the small fire arms of the Swedish army, weapons, and accoutrements (uniforms etc.) from the end of the seventeenth century up to our own day.

Among the historical museums in the provinces may be mentioned the Museum for Scandinavian Antiquities, the Collection of Coins, and the Victoria Museum for Egyptian antiquities, — all in Uppsala; the Historical Museum and that of Cultural History, both in Lund; and the historical section of the Gothenburg Museum (see p. 383).



National Museum. Entrance Hall and Stairway.

C) **Museums of Natural History.** *The National Museum of Natural History*, standing under the supervision of the Royal Academy of Sciences, is the richest and most important collection of natural history objects in Sweden. It embraces at present eight sections, each of which is managed by a superintendent with the title of professor. These sections are: a) the Zoological one of Vertebrates, which is the oldest, embracing at present over 2,350 stuffed mammals and 16,500 birds besides amphibia, reptiles, and fishes preserved in spirits; b) the Entomological section, and c) the division for Lower Vertebrates, with respect to which two sections the museum is doubtless the richest in the world in arctic objects; furthermore, d) the Zoopalæontological collection of fossil animals; e) the Botanical section; f) the section for Archegoniates

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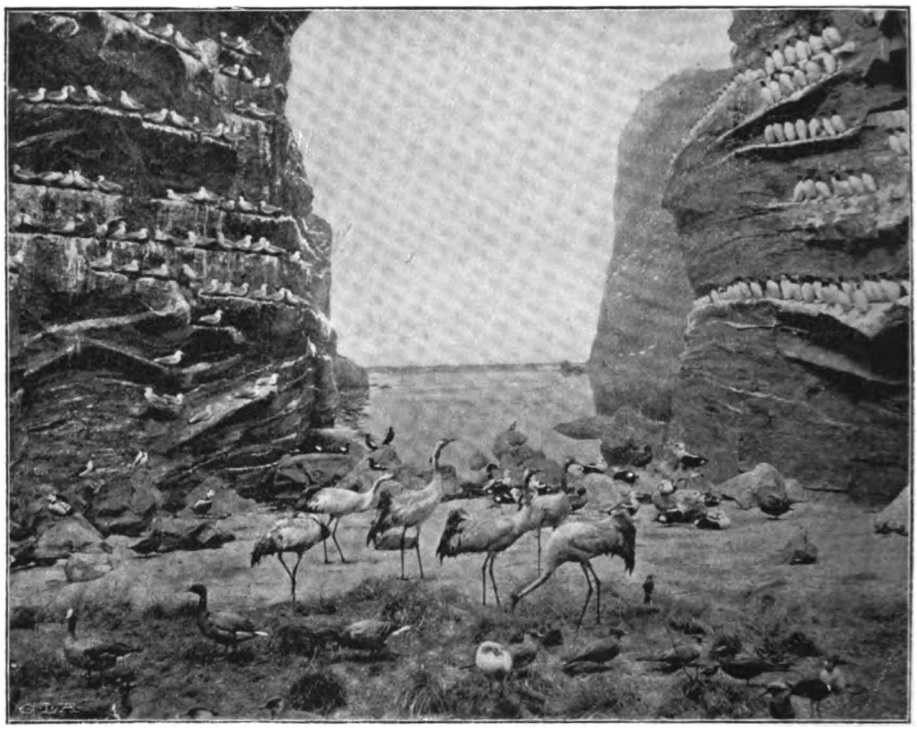
and fossil plants, embracing, more completely than any other museum, plant-fossils from the polar regions, as well as from the coal-bearing strata of Skåne; g) the Mineralogical section, which is considered fully equal to the most renowned mineralogical collections in other European museums; and finally h) the Ethnographical collection, which embraces 20,000 numbers.



From the Biological Museum, Stockholm.

Among the museums of natural history in the provinces, should be mentioned, in the first place, the *Zoological section of the Museum of Gothenburg*, containing rich collections from all divisions of the animal kingdom. Special attention may be called to the rich collection of home and foreign birds, the whale collection, the collection of fishes from the province of Bohusläu, and the great collection of sea invertebrates.

Among the natural history collections at the *University of Uppsala* we may mention the Zoological Museum and the Botanical Museum, whose herbarium of Scandinavian phanerogams is said to be the best of its kind. At the *Lund University* there are also considerable natural history collections, such as the Zoological Museum, the Botanical Museum, etc.

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Besides the aforesaid museums, most of the Swedish *State colleges* for facilitating instruction in the natural sciences, have herbariums, collections of stuffed animals, minerals, and other natural objects, some of which are quite important.

A *private* natural history museum of rather great interest is the *Biological Museum* of Stockholm, founded in 1893. This institution, which in its special line has no equal in Europe or elsewhere, contains an almost complete collection of the mammals and birds of Scandinavia, with about 3,000 stuffed specimens, and, by a panoptic combination of forest, mountain, and sea, shows how each kind of animals appears in its natural surroundings. This museum is arranged by G. Kolthoff, the taxidermist, assisted by Docent C. Bowallius and B. Liljefors, the animal-painter.

The North Museum and Skansen.

Self-knowledge presupposes, in the nation as in the individual, a certain degree of maturity, and the sciences named ethnology, folklore, history of civilization, etc. are young in comparison with others, and have in many places, likewise as in Sweden, not yet succeeded in asserting their rights in all respects. But by means of the energetic efforts of a private person, *Artur Hazelius* (1833/1901), Sweden has taken the first place among nations, in preserving objects illustrating the development of its own people and in this connection also of neighbouring peoples.

Artur Hazelius.

In 1872, Hazelius commenced his work of collecting, and as early as 1873 he could open the first section of his museum to the public, although at that time he could not even himself foresee the magnitude which this museum was going to assume. The museum was then called the *Scandinavian Ethnographical Collection*

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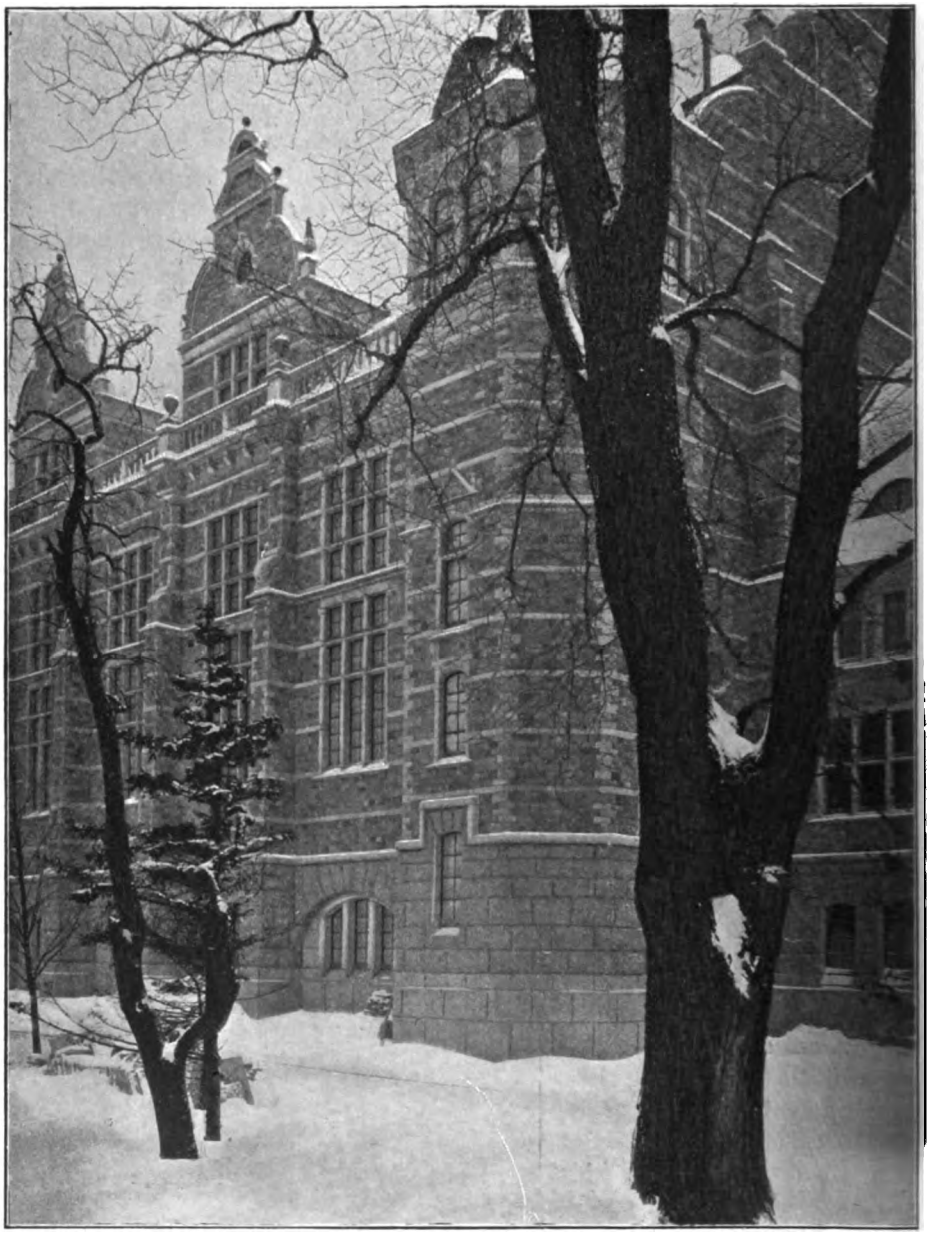

The North Museum, Stockholm. Photo. BENGT ORLING, Stockholm.

and was chiefly of a purely ethnographical folk-lore nature. Soon, however, the field of work widened, and it was found that the name ought to be changed into the **North Museum,** under which name the institution has since become world-renowned. At the time when this is being

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written, the general catalogue of the Museum counts 85,000 numbers, many of which embrace several — sometimes as many as a hundred — objects. Besides these, there is the library and the archives, and large collections of engravings, portraits (of these alone over 25,000), coins, counters, postage stamps, etc., which collections are not recorded in the general catalogue. The property of the museum is as yet deposited in separate and temporary quarters, but a fine structure is already to a considerable part erected, and will doubtless in a short time be fully completed. Although it enjoys a State subvention, the North Museum is an independent institution with its own Board of Directors, and, next to the indefatigable energy of its founder, it owes its existence chiefly to the patriotic generosity of private persons.

From the Skansen Open-air Museum in Stockholm.

The museum contains objects from Sweden, Norway, Denmark, Iceland, Germany; from Swedish, Norwegian, Finnish, and Russian Lappland, and from Finland, the Baltic provinces, and Greenland, which was inhabited by Scandinavians as early as a thousand years ago. Foremost among the different sections of the museum, should be mentioned the *Scandinavian Ethnographical Section.* In connection with this group, we may mention the *Archeological Section*, which contains fossil objects not only from Scandinavia but also from Lappland, Green land, and some even from Finland.

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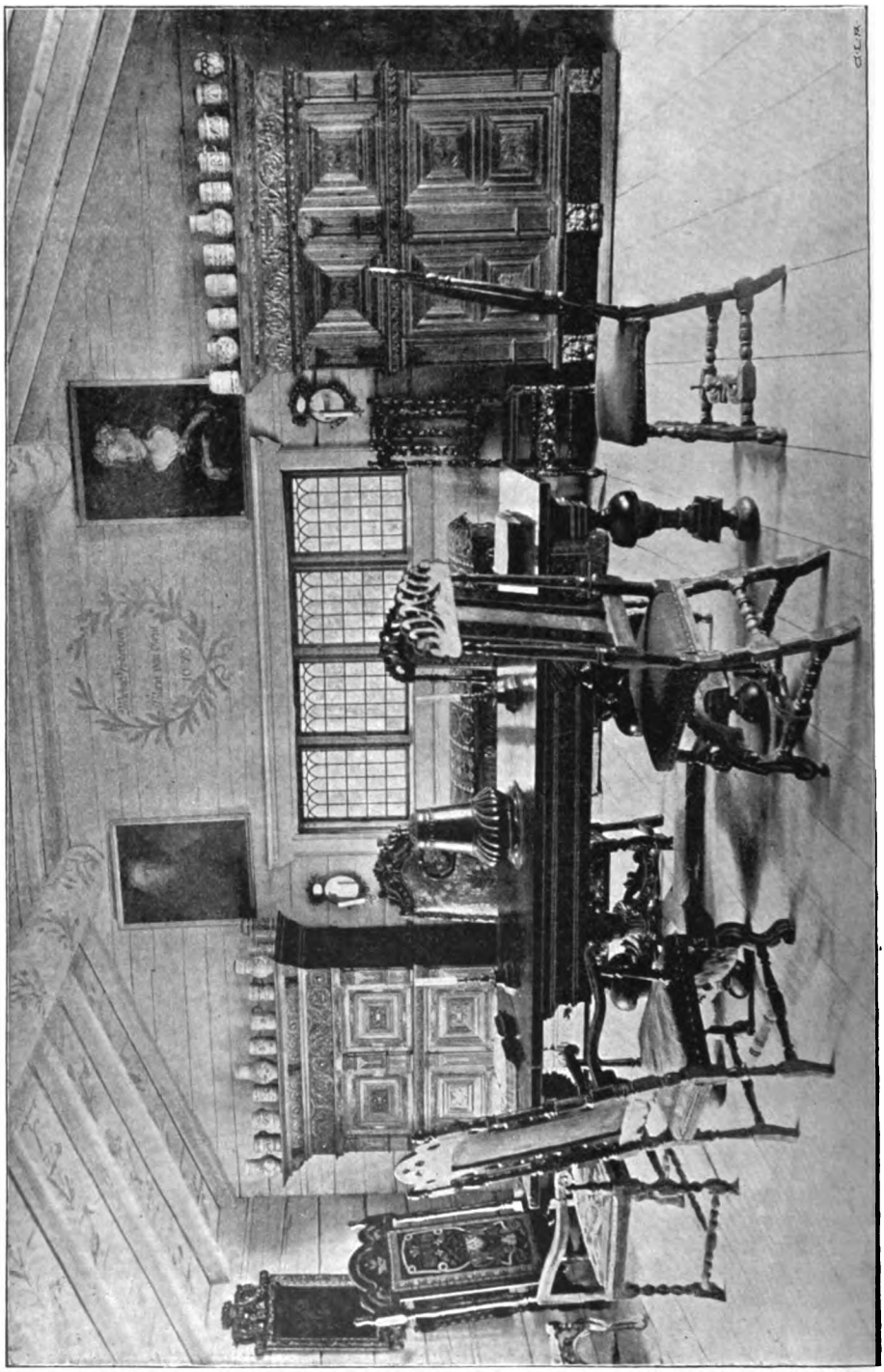

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Next to the collection of peasant-objects ranks for amplitude and value the *Guild Section*, which, for the sake of comparison, also embraces a very considerable number of German guild-objects, and with which there is connected a section containing objects illustrating the history of labour. Furthermore, there is a section illustrating the mode of life of the *higher classes* during different periods, and at the same time the development of the different *styles of art.* There is also a ceramic section containing mostly Swedish and Danish faiences and Scandinavian earthenware, a collection of glass, one of uniforms and weapons, a naval section, an ecclesiastical section, a section for textile art, one for musical instruments, one for instruments of punishment, one for the fire-service and the police, one for mementos of eminent Swedish men and women, one for objects of Jewish cult, and so on, the very rich pharmaceutic collection not to be forgotten. Unfortunately, it has of late proved necessary to store away a considerable portion of the collections, on account of their rapid and great increase.

Not satisfied with having founded the museum above described in outline, Hazelius began in 1891, near the new building of the North Museum, to lay out an *Open-air Museum* — being an annex, though of a distinct and wholly unique character. For the main museum he had already procured complete interiors of peasant-homes, and these — showing the ethnographical objects in their everyday, internal combination — proved the most instructive to the public of the whole varying contents of the museum. Consequently the thought arose in the mind of the Director, to incorporate with the museum buildings with their furniture fittings; and it was to solve this problem that the open-air museum, which bears the name of **Skansen**, was founded in the aforesaid year. But besides this object, several other advantages were gained, among them a suitable exhibition place for such objects as it was difficult to house within the walls of an ordinary museum. Moreover, the open-air museum became a place where living pictures from the nature and folk-life of the Scandinavian North could be exhibited. A uniquely planned zoological garden of the North and, to a certain extent, a botanical garden, although unconfined, have been laid out in Skansen, and on certain occasions every year, national-festivals and historical processions are got up there, which give the public an opportunity to become acquainted, by means of actual and living object lessons, with the Swedish people in times past and present.

Among the various attractions of Skansen, we may here mention some particular ones. Among the objects exhibited, special attention should be called to the **peasant-cottages** and other buildings, which have been moved to Skansen from the places where they originally stood, and which not only by their furniture and fittings, but also by their immediate surroundings, present faithful pictures from the provinces where they originated, and at the same time, seen as a whole, show the principal features of the history of Swedish peasant dwellings. Besides a whole Lapplanders' camp, with Lapps, dogs, and a reindeer-yard, and an Eskimo village with both winter and summer huts, with dogs, sledges, and kayak, we find here the very primitive Swedish charcoal-burner's hut, and even the unique »Slogboden» (shed for hay-makers at the forest-marshes), the simple

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hillside hut, half embedded in the ground, the summer dwelling of the mountain herdsman, with all the very simple buildings appertaining thereto, the more advanced peasant's house from Dalarne (Dalecarlica), and the modest log-cabin from Vestergötland, a whole farm with barns, stables, and other outhouses from the province of Halland, the peasant homes from Blekinge and Helsingland testifying of oldtime opulence, and the rich miner's home (Laxbrostugan) from the Vestmanland mining-district. We also find very picturesque *belfries* from Jemtland and Östergötland, and a storehouse, »fatbur», from a gentleman's country seat in the latter province in the fifteenth century (a copy), and several other farm buildings, such as a granary from Dalarne, a provision-house from Småland, a mill from Vestergötland, etc. In the above mentioned large storehouse there is preserved a very interesting collection of old agricultural implements, and not far off we see ancient vehicles and boats. — Among the arrangements for the zoological collections, the polar bear grotto and the eagle-cage deserve special notice. — The open-air museum of Skansen, situated on a spot especially favoured by nature and rich in varying and grand views, has become a very popular promenade, and is beautified by many expensive plantations.

Lapps at the Skansen Museum in Stockholm.

During the quinquenniums of 1876/80 to 1896/1900 the North Museum (the indoor sections) have *been visited* by respectively 107,468, 107,203, 90,591, 121,482, and 135,265 persons; the entire number of visitors from the opening of the museum (October 24, 1873) to the close of 1900 amounts to 607,726. Skansen has been visited by 2,932,214 persons, of whom 782,656 during the time from October 11, 1891, to the end of 1895, and 2,149,558 during the period 1896/1900. The entire number of visitors at both the establishments to the end of the century thus amounted to 3,539,940 people.

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Besides the leading part which the North Museum plays in the sphere of museum instruction, it has also had a powerful influence in other respects, and not least by contributing more than anything else, probably, to call into life that true nationality of taste which has of late appeared ever more distinctly among the Swedish people.

Libraries.

The principal library of Sweden, the *Royal Library* (Kungl. Biblioteket), dates from the time of King Gustavus Vasa (1523/60). As early as 1661 a law was passed entitling the Royal Library to a copy of every publication printed in the Kingdom. This law is also embodied in the press-law now in force. During the period 1871/77 a special building was erected for the Royal Library in the Humlegården Park, in Stockholm. The Library possessed at the close of 1900 about 390,000 volumes and about 329,000 pamphlets, besides 95,100 plates and maps kept in 12,000 portfolios. The manuscript section contains about 12,000 manuscripts and 1,263 portfolios. The annual increase amounts at present to 30,000 volumes and pamphlets. In the year 1900 the number of visitors amounted to 30,789, and 71,610 volumes were handed them. The number of volumes lent for home use amounted to 9,597.

In Stockholm there is a large number of Special Libraries, among which we might mention: a) The *Library of the Royal Academy of Sciences*, embracing natural science, astronomy, and mathematics. The number of volumes in this library amounted in 1900 to about 90,000, besides 40,000 pamphlets. The Library receives in exchange for its own publications those of about 700 learned societies and scientific institutions. During 1900 the number of visitors amounted to 3,377, volumes referred to at the library were 5,584, and the number of volumes lent for home use, 2,263. — b) The *Library of the Caroline Institute of Medicine and Surgery*, containing the country's greatest collection of medical literature, possesses 35,000 volumes and 15,000 pamphlets. — c) The *Library of the Central Gymnastic Institute* for gymnastics, anatomy, and physiology, has about 5,500 volumes. — d) The *Library of the Royal Academy of Literature, History, and Antiquities*, for archeology, numismatics, and history, contains over 16,000 volumes. — e) The *Library of the Riksdag*, for jurisprudence, politics, and political economy, the parliamentary documents of foreign countries, — in all 32,000 volumes. — f) The *Library of the Central Bureau of Statistics*, for statistics and political economy, contains 35,000 volumes.

Among the provincial libraries that of the *Uppsala University* is the most important. It has been entitled, ever since 1707, to receive a copy of every publication printed in the Kingdom. In 1900 the library had about 340,000 volumes and 12,500 manuscripts. In 1900 the number

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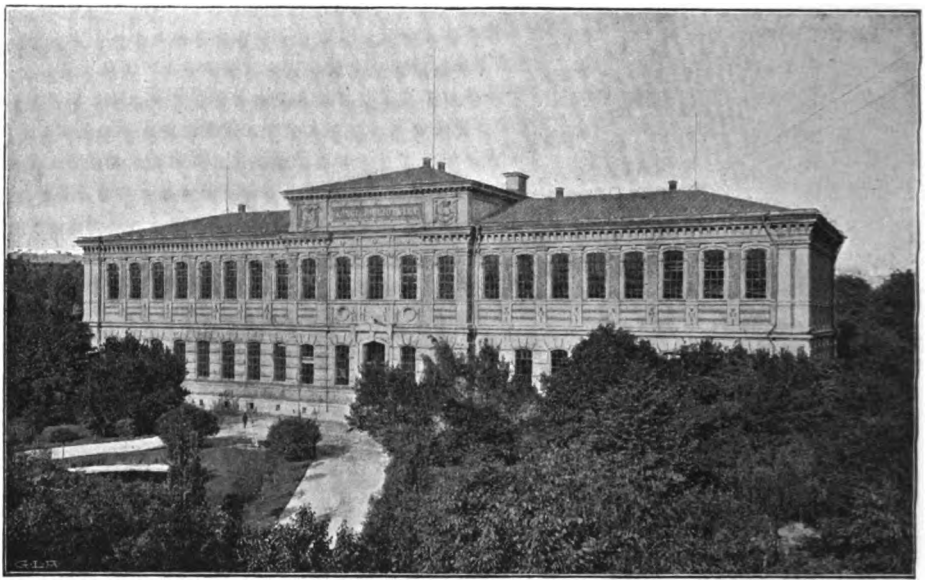
of visitors amounted to 6,677, to whom 34,754 volumes were handed. The number of loans during the same year amounted to 19,318 volumes, of which 5,136 volumes were lent to scientific institutions. In size next to the Library of the Uppsala University, comes the *Library of the Lund University*. Ever since the beginning of the eighteenth century the library has been entitled to receive a copy of every publication printed in the Kingdom. The library contains at present about 185,000 volumes, besides pamphlets, and 5,000 manuscripts. In 1900 the number of visitors amounted to 11,768 persons, for whom 39,548 volumes were taken down, and the number of volumes lent during the same year was 12,770.



Royal Library, Stockholm. Photo. TOR CARLSON.

Among other libraries outside of Stockholm the *City Library of Gothenburg* is the most important, and contains over 60,000 volumes. In 1900, new quarters were erected for the same. The yearly number of visitors amounts to about 8,000, the number of books taken down to more than 5,000, and for home use about 5,000 volumes were lent.

At all the *State Colleges* in the Kingdom there are libraries which are also accessible to the public. Some of them are very old. The most important is the very valuable Library of the *Linköping* Diocese and State College (Stiftsbiblioteket), with about 100,000 volumes and 1,600 manuscripts, besides 500 letters on parchment.

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People's Libraries.

The origin of **parish libraries** in Sweden can be traced as far back as the beginning of the 17th century, but it is not till the 19th century that they have come to be of any greater significance. The same educational movement which, in 1842, gave to Sweden its *obligatory* common schools, also called forth measures for the more general establishment of parish libraries.

Several of the most distinguished men of Sweden in the middle of the 19th century, worked zealously in the service of the library movement, and foremost among these, that warm-hearted friend of the education of the people, P. A. Siljeström, the advice and directions of whom, as well as a list of literature drawn up by him, served as a guide at the establishment of several hundred libraries during the decades of 1851/1870. In 1870 the number of parish libraries in Sweden may be regarded as having amounted to about 1,800. At this time, however, the interest in the matter began to decrease, so that several of the libraries fell into desuetude and were dispersed. But these last years the interest has re-awakened, and at present the movement for the establishment and extension of people's libraries is unquestionably making headway.

The parish libraries *are owned* by the respective communities; their support is mostly dependant, however, on the benevolence and generosity of private individuals. In 1902 the Riksdag handed in an application to the Government regarding investigation as to the conditions on which State grants might be given to people's libraries. — In the country the parish libraries seldom contain above 500 volumes. Some few have 1,000 to 3,000 volumes. In the cities most are of this size. In the country as well as in the cities, it is usual to have the libraries quartered in school-rooms or municipal offices; in most cases they are attended to by the Common school teachers. Some single ones of the libraries lately re-established have their own premises. The books are selected from the common and more popular literature. The different branches of this literature are generally represented in each library. Where the libraries are well kept and augmented yearly, they are diligently made use of. The greatest part of the book-loans are taken by persons of the working class, mostly at an age of 15—30 years. Books of a narrative style, as also descriptions of travels and accounts from history, are preferred; next in order come works of natural history and popular works of astronomy, physics, and chemistry; religious works, on the contrary, are less read, as the families usually are amply furnished with such. — As one of the best libraries of this kind may be mentioned that of the *Hedvig Eleonora* parish in Stockholm.

The most notable collection of books for the people is, however, to be found in the *People's Library of Gothenburg City.* This is founded on donations made by members of the Dickson family. The Town council selects the members of the Board having charge of this institution. The library is lodged in a large and beautiful building, erected expressly for the purpose, centrally situated at a principal crossing of the largest street of the town. The apartments are spacious, lofty, and light, and the regulations for visitors especially appropriate. Admission is free, and in 1901 the number of visitors amounted to 145,000, of nearly all ages and grades of cultivation. For reading in the rooms were handed out during the same year 54,300 volumes, beside which 26,200 loans were granted for home reading. The whole collection comprises about 9,000 volumes.

An association for the establishment of people's libraries and reading-rooms was formed in Stockholm in 1900. The object of the Association is to work, in dif-

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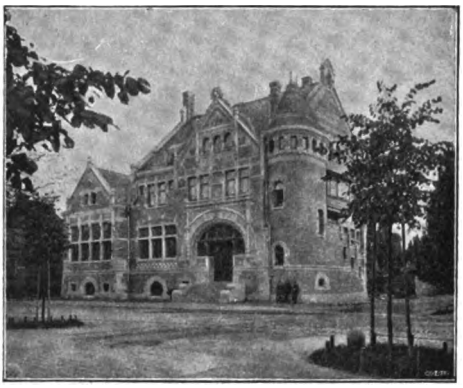

People's Library of Gothenburg City.

ferent ways, for the enlightenment of the poor people, especially by establishing Reading-rooms, in connection with a collection of books for home reading. A couple of years earlier, interested persons at Kungsholmen in Stockholm, the largest manufacturing district of the city, had established a Reading-room, which has been transferred to this Association. In the beginning of 1901 the Stockholm town-council voted means to the Association for establishing new Reading-rooms, and also granted a yearly support for these. — In Gothenburg, there are Reading-rooms established by the »Bolag» or public company for the sale of spirits (see above p. 279); these are frequented by more than 300,000 persons yearly. Also in other places having a numerous manufacturing population, Reading-rooms have been started.

There are several **private collections of books** for the people in the towns, and in other thickly peopled localities. The largest of them is the *Working-men's Library* (Arbetarbiblioteket) in Stockholm, which is established and owned by a Library Association, formed by co-operation of the different associations of working-men in the city. This library owns above 10,000 volumes, and in 1901 there were made more than 45,000 book-loans. It has been supported up to this time entirely by contributions from the working-men themselves, but has now been voted a grant from the community, which in 1902 amounted to 3,000 kronor. The library was then moved into apartments especially fitted up for the purpose in the »People's Palace», which has been erected by the Trades' Union League for the cultivation of the working people. This library is of interest not only for its considerable size and the diligency with which it is made use of, but also for its being founded and conducted exclusively by the working-men themselves.

Other association libraries of significance in Stockholm are those of the Workmen's Institute (Arbetarinstitutet, see p. 316) and of the old Workmen's Association for all the trades (Arbetarföreningen).

Among the students at the University of Uppsala two Societies have been formed, called *Verdandi* and *Heimdal* (the one of a more liberal trend, the other more conservative), which are working with great energy for the development of people's libraries. They have published catalogues of suitable books, they facilitate purchases at a reduced rate, and provide for the publication of popular scientific works.

In the Swedish *Common schools* the General Association of Swedish Common-school Teachers (Sveriges allmänna folkskollärareförening; see p. 293) has worked for the instituting of *Pupils' libraries*, which thus through the pupils are accessible also to elder brothers and sisters and parents.

Newspapers.

The first newspaper in Sweden appeared in 1645. It is still published, under the name of Post- och Inrikes Tidningar, and is without doubt one of the oldest still existing newspapers of any country. Since 1791

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its publication is a privilege of the Swedish Academy. This paper is to a certain degree an organ of the Government, and contains, before others, all official announcements.

For the *right to publish* periodical publications, it was necessary in ancient times to procure a privilege granted by the Government, and they were besides subjected to censorship, as well as all other printed publications. During the so-called »Era of Liberty» (1718/1772, see p. 86), the liberty of the press was, however, introduced, and it is worthy of notice that Sweden was the first country where regulations in this direction were given the character of a constitutional law (1766). Among the four constitutional laws now in force in Sweden, there is also a law of 1812 concerning the liberty of the press, which contains detailed instructions as to the right of issuing printed publications, the responsibility therefore, and the legal mode of procedure in cases of press-prosecution; in these cases a *jury* is employed — a legal trait which in other cases is foreign to Sweden.

Every person who has not been punished for infamous crime or declared unworthy to plead another's cause before court has a right to issue periodical publications, after having made application to the Minister of Justice. Publishers of periodicals are, with respect to responsibility, considered as authors.

A review of the development of the periodical literature in Sweden, as wel. as of the number and manner of publication, at different times, of the political, advertisement, and newspapers proper, is given in the Table on the following page (Table 53).

The papers *most known* in Sweden are at present — besides the aforesaid so to speak semi-official Post- och Inrikes Tidningar — Stockholms Dagblad (moderate), Aftonbladet, Dagen, Dagens Nyheter, Stockholms-Tidningen, Svenska Dagbladet, and Svenska Morgonbladet (all liberal), Nya Dagligt Allehanda, Vårt Land, and Stockholms-Bladet (all conservative), Socialdemokraten (socialistic), — all published in Stockholm.

Among the newspapers published outside of Stockholm, we might mention: Göteborgs Handels- och Sjöfartstidning, Sydsvenska Dagbladet, Skånska Dagbladet, and Malmö-Tidningen (the latter three in Malmö), Nerikes Allehanda (in Örebro), Östergötlands Dagblad (in Norrköping), Sundsvalls Tidning — all of liberal political colour; Norrköpings Tidningar, Östgöta Correspondenten (in Linköping), Morgonposten (in Gothenburg), Göteborgs Aftonblad, Helsingborgs-Posten, Gefle-Posten, Smålandsposten (in Vexjö), Sundsvalls-Posten — all conservative.

Out of 350 political newspapers existing in 1900, 59 were published in *Stockholm*, and of the 58 daily (or still more frequently) issued papers, 14 were published in the capital. Of late years, the *provincial press* has been considerably developed. In 1850 there was only one daily paper outside of Stockholm, but in 1900 there were 44.

The price of subscription on Swedish papers has always been quite low, and has, of late, through competition, been still more reduced. The principal newspapers appearing daily or more often cost at the most 18 kronor a year, and dailies have been issued at the very low cost of 3 kronor. Also the *advertizing-rates* are very low, or from 6 to 90 öre per line. (A krona à 100 öre = 1·10 shilling or 0·268 dollar).

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With regard to the *circulation*, some papers have reached 100,000 copies, and beyond, which is undeniably a high figure for a population of five millions. Several ten thousands of copies is no unusual circulation. On the other hand, the circulation of *periodicals* (magazines) is for the most part small.

In connection with the press, we should mention the *Journalist Club* (Publicistklubben), which was founded in 1874, and aims at providing its members an opportunity of consulting and deciding on common press-interests and to enjoy the advantages of associating with colleagues irrespective of political or religious opinions. In the middle of 1902 this club numbered 540 members, 19 of whom were women. The club has sent delegates as representatives for the journalists of Sweden at the International Journalist Congresses which have been held annually ever since 1894 and acted as hosts themselves to the fourth Journalist Congress in Stockholm 1897. At the request of the Journalist Club Dr. *Bernhard Lundstedt* has compiled a *Bibliography of the Periodical Literature of Sweden* (3 vols., Stockholm 1895—1902), in which all the periodicals published in Sweden 1645/1899 are carefully described in their chronological order, with full indexes.

TABLE 53. *Number of Newspapers and Periodicals published in Sweden.*

	During the whole period		During the years mentioned below					
Political, news and advertisement papers:	1645/99.	1700/99.	1800.	1830.	1850.	1880.	1890.	1900.
Appearing once a week	7	66	10	24	45	68	145	118
» twice »	1	36	5	17	25	74	76	92
» three times »	—	4	5	6	4	27	59	64
» four » »	—	1	—	1	—	3	8	18
» six » »	—	13	1	6	6	11	22	49
» seven » »	—	—	—	—	—	—	5	7
» twelve » »	—	—	—	—	—	—	1	2
Total	8	120	21	54	80	183	316	350
General and Literary Periodic.	1	122	3	3	16	22	33	30
Theological and religious »	—	13	—	1	13	25	50	68
Other special periodicals.....	—	88	21	41	61	114	204	285
Total	**9**	**343**	**45**	**99**	**170**	**344**	**603**	**733**

8. LITERATURE.

The activity of a people within the field of literature and art as well as that for scientific research constitutes, as it were, the summit of its intellectual culture. Therefore, a work on Sweden and its People would be incomplete without a brief account of the subject, although space forbids more than a mere summary.

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With regard to literature, the love of nature inherent in the Swedish people, and their great power of imagination, have found expression in very rich lyric, or perhaps more correctly, lyric-epic poetry. On the other hand, our dramatic literature has, as a rule, been of less importance. The *epochs* of Swedish literature are, on the whole, simultaneous with corresponding epochs of universal literature or — before the beginning of a more intimate cultural intercourse with the peoples of Southern Europe — still more accurately with the different phases of that culture which for a long period was largely common to the *Northern* peoples.

In all probability Sweden has had an ancient literature of the same kind as the Icelandic Eddas and the Anglo-Saxon Ode of Beowulf. Many reasons point to the last mentioned epic as being founded on poems of Swedish origin, and by inscriptions on stones it has been proved that at least some of the sagas which form the subjects of the Eddas were known also in Sweden. At the sacrificial festivals in old Uppsala, according to Adam of Bremen, many songs were sung. The traces of this very ancient literature are, however, very rare and consist principally in short *inscriptions on the runestones*. The number of such stones in Sweden is about 2,000, half of which are found in Uppland. The oldest among them originate from the sixth century, but most belong to the period of transition between Paganism and Christianity (at about 800—1000). Some of the inscriptions are written in alliterative versification and contain extracts of long odes now lost. This is particularly the case with the inscription on the stone called »Rökstenen» in Östergötland, the longest one known in the world, consisting of 750 runes.

Another branch of literature, for which our ancient times are also noted, is the *Laws of the Provinces*, which prove an original and independent conception of justice. These laws were to begin with written in rhyme for the purpose of being better remembered, but later on they were rewritten in prose. The oldest of the written laws is »Vestgötalagen» (the law of the province of Vestergötland), which dates back from the commencement of the thirteenth century.

On the introduction of Christianity and the incorporation of Sweden with the Catholic Church, the pagan literature vanished. Latin became the language of the learned; and religious literature was all-prevailing. It is the era of mysticism and scholasticism. *Saint Bridget* (1303/73), the most eminent Swedish author of the Middle Ages, is the representative of mysticism. Her »Revelations», first written in Swedish and then translated into Latin by her father-confessor, are distinguished by a rich imagination and an abundance of figures and symbols.

At this time the Swedes came in contact with the knightly spirit of Europe. That gave them a taste for the romance of the Middle Ages, which found expression in various adaptations and translations of foreign romances of knighthood.

The purest national poetry of medieval times is, however, those poems which we call *national ballads* (Folkvisor). These songs, of which the greatest number is the common property of all Scandinavia, have survived on the lips of the people to the present day. These national ballads vary considerably in their contents. Some of them deal with the warriors of the ancient heroic sagas and their deeds, or of divinities of nature and their relations to man; others, and the most numerous, sing of knights and love. But whatever the subjects may be, the literary style of the songs is epic, sometimes intermingled with dramatical passages; conversations and events are rendered in a lively and striking manner.

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Humanism has left only very faint traces in our literature from the fifteenth and sixteenth centuries. Only with the Reformation literature revives. The van of thought during the time of the Reformation was guided by *Olaus Petri* (1493/1552), an extremely nobleminded, independent and courageous man, a personal disciple of Luther. All his writings are marked by powerful geniality, and his style bears the stamp of simplicity coupled with erudition and an unusually keen view. Few authors have handled our language as he, and rarely has it been so beautifully or so lucidly moulded as in his works. But that freedom of research which characterized the early days of the Reformation was quenched after his death, and the religious literature grows more orthodox and dogmatic. At the end of the sixteenth, and in the beginning of the seventeenth century, theology is the main subject of interest and, barring history, the other sciences are neglected. Polite literature is during this period of small value.

Georg Stiernhielm.

During the time of the Thirty Years' War a great change takes place. Sweden then comes in closer contact with the civilization of Germany, France, and Holland, and with the spirit of the Renaissance. For the first time it is understood that poetry is an art and not merely a handmaid of religion. Yet there is a vein of religious feeling even in the merriest songs. Strong and sparkling humour distinguishes most poems of this period, and the national character is clearly discernible under the antique garb. This is particularly the case with *G. Stiernhielm* (1598/1672), the most prominent Swedish author of the seventeenth century. His principal work, entitled »Hercules», depicts the deeds of a Swedish youth during that glorious period. Stiernhielm was a man of manysided endowment; but, like so many other eminent Swedes of ability, he frittered away his great gifts. Besides poetry, he devoted himself to mathematics, philosophy, and archeology. In consequence of the political importance of the country, the latter science revived, and became of especial interest because it served the purposes of patriotism. Efforts were made to prove that the ancient history of Sweden could be traced as far back as that of any other nation, or still farther. *O. Rudbeck* (1630/1702), eminent above all as a natural philosopher, has given a grand expression to these ideas in his genial and learned though fantastic work, entitled »Atland», in which he attempts to prove that Sweden is the oldest civilized country on the face of the earth.

But our political greatness vanished with Charles XII, and the misfortunes of the country during his reign recalled all minds to sober reality. During the so-called »Frihetstiden» (The Era of Liberty; 1718/72), a period of an almost republican constitution, all energies were devoted to the improvement of the interior conditions of the country. Hence scientific interests were directed principally to utilitarian ends: political economy and the natural sciences

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prevailed. It is the era of Linné and Scheele. Literature also flowed in new channels — the didactic and political. *O. von Dalin* (1708/63), the leading spirit during the early part of the period, calls vividly to mind the contemporary English and French authors: the same attempt to gain a correct and lucid style and the same frigidness. Following Addison's and Steele's example, he issued a weekly periodical »The Swedish Argus». The influence of Dryden and Swift appears in his political allegories and his poetry. Dalin is pre-eminent partly on account of the development of style which Swedish prose gained through him, partly because he opened the way in Sweden for the ideas of the Time of enlightenment. These ideas were still more developed and confirmed through Mrs. *H. Ch. Nordenflycht* (1718/63), Count *G. F. Creutz* (1731/85), and Count *G. F. Gyllenborg* (1731/1808), who, moreover, specially favoured the French taste.

But *K. M. Bellman* (1740/95), the most original and perhaps the greatest of all our poets, is entirely national and does not seem to have been much influenced by the ideas and tendencies of his time. Bellman's poetry gives expression to a Dionysian joy at the pleasures of life and a melancholy lament at their vanity. He has especially an eye for the beauties of nature, and no other poet has depicted the fairness of the scenery around Stockholm as he. With regard to form too, Bellman is quite original and the virtuosity with which, despite a seeming carelessness, he handles the rhythm and the meter, is unexcelled. His most celebrated work is a collection of epic-lyric songs, entitled »Fredman's Epistlar», in which he immortalizes some well-known characters of Stockholm, then living.

Statue of Karl Mikael Bellman. At Hasselbacken, Stockholm.

These Bacchanalian revelers are portrayed with powerful realism that calls to mind the expressive paintings of the Dutch Masters, as well as the graces of the Rococo period. The charm of Bellman's songs depends largely on the music which is almost inseparable from the poem; his poetry is composed for singing, not for reading. The poet has himself set tunes to some of his songs, if not, he has generally borrowed the melodies from known ballads and then altered them to suit the words, thus creating a harmoniousness of complete fusion. Even in our days Bellman's songs are sung by the people in preference to others.

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The French influence, which had begun to assert itself during the Era of Liberty, reached its summit during the reign of *Gustavus III* (born 1746, reigning 1771/92), one of the »enlightened» rulers of this era. Gustavus III was French in his education and inclinations, and during his reign French ideas and French taste were dominant. But, though the culture was foreign, nevertheless its tendencies were at the bottom Swedish, and the poets most frequently treated patriotic subjects, even if the style showed signs of foreign impulse. Taking the French Academy as a model, the King founded the Swedish Academy and entrusted to its members the task of devoting themselves to rhetoric and poetry, as well as to the cultivation of the language. Gustavus III above all took an interest in the drama, and, jointly with his protégés among the poets, wrote several dramas and opera librettos. Chief among these co-workers of the King was *J. H. Kellgren* (1751/95) who, beside Gustavus III, is the most typical representative of his period. By his study of French literature Kellgren had gained a strong sense of form, hence, his poetic style is unusually perfect. Like a true follower of Voltaire, he was a champion for civilization and humanity, and with the sharp weapons of satire he fearlessly combated in his newspaper »Stockholmsposten» all forms of ignorance, brutality, and superstition. All kinds of prejudice, all egotism, and all abuse of power found in him an enemy ever on the alert. Although Kellgren was French by education, there was nevertheless a Germanic trait in him which could not be entirely effaced; and especially in his later poetry, a depth of feeling and tender sincerity show that this pre-eminent mastermind of his time had finally perceived the hollowness of an onesided intellectual enlightenment.

K. G. af Leopold (1756/1829), the contemporary and fellow-poet of Kellgren, was possibly superior to him in genius. Leopold's poem-letters, tales, and odes are more elegant in form than Kellgren's, but lack their warmth of feeling and their enthusiasm. In *Anna Maria Lenngren* (1755/1817), the third propagator of the ideas of this era, it is difficult to decide which to admire most — her noble heart or her mordant satire. Her strength lies in delicate genre-portrayal.

In opposition to Voltaire's philosophical ideas, a school arose, represented in France by J. J. Rousseau and in Germany by the »Sturm und Drang» authors. *T. Thorild* (1759/1808) was the champion for this tendency in Sweden; he advocates with enthusiasm the rights of feeling and of nature and in a powerful, though often exaggerated way points out the limited perspective of the Franco-classic taste. He also insists on the consanguinity which unites our people with the English and the Germans, and which ought to induce us to take our models from them in the first place. Nevertheless, Thorild was too obscure and paradoxical an exponent and not a sufficiently true poet to be able to vanquish the old school. Likewise was *B. Lidner* (1759/93), a poet of kindred spirit, a personality too weak and too irregular of habit to be able to perform such a task, though possessing an unusually rich, but unrestrained imagination.

For the space of a few years after the death of Gustavus III the French academical school ruled supreme over polite literature, and poetry degenerated into abstract formalism without any corresponding emotional contents, a circumstance which proves that this tendency of the poetic taste had already had its best days. But there was a crop of gifted poets even during this period, though their individuality and originality could not fully develop or mature under the sway of the Academy. Such was the case with the two Bishops *F. M. Franzén* (1772/1847) and *J. O. Wallin* (1779/1839). Franzén, a gentle and ardent spirit, created a simple, purely idyllic lyric, limpid, translucent as a crystal spring, innocent as the eyes of a child, and wistfully eager of celestial purity. Wallin, whose temperament was stronger and more gloomy, is the greatest hymnologist of our country; his principal work is the hymnbook of 1819, still in use.

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Esaias Tegnér.

After the revolution of 1809 and the loss of Finland, a new spirit manifests itself in our literature. The Romantic School appears, and a violent struggle commences between it and the Academical tendency. At the head of the Romanticists we find the young *P. D. A. Atterbom* (1790/1855), the founder of an association called »Auroraförbundet», and the most prominent of those poets who published their productions in the »Fosforos» (a periodical symbolizing the new light by its scarlet cover). Atterbom, who received his earliest impulses from German poets and philosophers, especially from Tieck and Schelling, sought to give to poetry the vague longing of music, and also something of the meditative speculation of natural philosophy on the essence of things. Although his poetry thus became somewhat obscure, he nevertheless possessed superior poetical gifts, and his dramatical saga »Lycksalighetens ö» (The Island of Felicity), inspired by a medieval legend, is one of the most beautiful poems created by Romanticism.

Another no less typical representative of the Romantic School (who did not, however, belong to Atterbom's circle) is *E. J. Stagnelius* (1793/1823). Stagnelius is a mystic, whose poetry, filled with and coloured by gnosticism, oscillates from ardent sensuality to deep pain at the failings of earthly life. No Swedish poet has created such harmoniously euphonious stanzas as he. Stagnelius attempted all the departments of poetry, even that of the drama, and he chose his subjects from widely different spheres — the world of antiquity, the past ages of Scandinavia, and ancient Christian legends. Still another representative is *E. Sjöberg* (1794/1828, pseudonym Vitalis), who was influenced by neo-romanticism, applied its principles independently in his noble, melancholy poems, and also with jesting satire combated its exaggerations.

Despite these superior poetical abilities, the Romantic tendency never really became popular in Sweden. It lacked too much that transparency which the nation likes; and it was not through the New School, but at the side of it, that Swedish literature at this time attained almost classical perfection. The men who gave rise to this happy condition were *Esaias Tegnér* (1782/1846) and *E. G. Geijer* (1783/1847). These two, representing different sides of the Swedish national

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temperament, are generally considered — together with Runeberg, who appeared somewhat later — as our national poets. In spite of all their individual dissimilarities, they seem so much to belong to each other in the consciousness of the people, that one of them can hardly be mentioned without a thought of the other. They were both natives of the province of Vermland, both were for some time members of »Götiska förbundet» (Gothic Society), that had made it a task to strengthen and increase the interest in the past ages of the Northern countries, in order thereby to incite the rising generation to energy and resolute courage. Both were University professors, Geijer at Uppsala, Tegnér at Lund (Tegnér being later made a bishop, for which appointment he was hardly suited); and both wrote poems on subjects from olden times. But it is only in these exterior traits that they resemble each other. Geijer, who was also a philosopher and a composer, is above all the greatest historian of Sweden. After having associated himself with Romanticism for some time, he changed into the foremost defender of the liberal ideas of his time. His poems, which are not many, possess a manly and national ring.

Tegnér, who had greater and more splendid poetical gifts, but a less harmonious nature than Geijer, embraced at first the academical ideas. His clear poetic genius had been formed in the school of Voltaire, and under the influence of the poetic circle of Gustavus III; but he received yet stronger impulses from Greece and from Schiller, whose strong love of liberty he shared. Many of his best poems and speeches boil with indignation at the policy of the Holy Alliance and the reaction in Europe. In the poetry of Tegnér there is a blending of Greek and Northern features. In form, it is distinguished especially by a dazzling wealth of metaphors. In universal literature Tegnér is known above all by his lyrical epic »Fritiofs Saga», which has been translated by some fifty different hands into eleven foreigu languages.

The ideas of the Gothic Society found a more enthusiastic than critical adherent in *P. H. Ling* (1776/1839), the creator of Swedish gymnastics. He strove in his poems to imitate in rude strength the ancient heathen bards of Sweden. The poetry of Ling is forgotten, but his system of gymnastics survives.

K. J. L. Almqvist (1793/1866) is an exponent of romanticism about to change into radical subjectivism, and rises against all kinds of authority, be it the state, religion, or morality. He has given expression to his moral skepticism in one of those paradoxes which he loved to scatter about: »Two things are white: innocence and arsenic». Almqvist is perhaps the most universal of all our authors; he attempted everything: history, pedagogics, lexicography, mathematics, music, and all kinds of poetic art. He has been the delineator of all periods and of all lands, even the most exotic, and his pictures are made with astonishingly true colour, both as regards time and place. His motto was, »Thus I paint, because thus it pleases me to paint». Almqvist may be called a romanticist, but he was just as well a realist, a psychologist, and a symbolist half a century before the idea of symbolism rose to conscious recognition. He is the great »bewitcher» in Swedish literature. His chief literary works are the two collections combined within the frame of »Törnrosens Bok» (The Book of the Wild Rose).

Just before the middle of the nineteenth century, poetical productivity entered a period of weakness, characterized mainly by imitations of Tegnér and romanticism. Among the poets of that period may be mentioned *K. V. Böttiger* (1807/78), a refined and gentle spirit.

At this time people in Sweden, as in the rest of Europe, began to tire of romanticism. Liberalism, which counts its origin from the July Revolution, made its entrance, and already in the later periods of the productivity of Geijer and Almqvist these ideas are clearly discerned. But the liberal views are fa-

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voured especially by some young writers and authors, gathering around *L. J. Hierta* (1801/72), who formed an epoch in the history of the Swedish press by his newspaper »Aftonbladet». Generally the authors of this time are less theoretical and esthetical than practical in character. Among them may be mentioned *O. P. Sturzen-Becker* (1811/69; pseudonym »Orvar Odd»), the finest and most brilliant Swedish »causeur» and novelist, formed in the school of Heine and the French essayists; and *A. Blanche* (1811/68), known by his comedies and novels in the style of Eugène Sue, and above all by his sketches of Stockholm life. Among the leaders of liberalism outside of this circle is to be counted *K. V. A. Strandberg* (1818/77, pseudonym »Talis Qualis»), a lyric poet with an energetic, ringing tune, and a distinguished translator. Among his translations is one of Byron's »Don Juan». Then there is *B. E. Malmström* (1816/65), who, opposing

Viktor Rydberg. Portrait by A. EDELFELT.

the new romanticism, produced poems characterized by Swedish manliness and ancient classical culture, and which were received with admiration by the young students of that day. Enthusiastically hailed was also *J. Nybom* (1815/89), whose somewhat high-strung lyrics gave expression to the young students' enthusiasm for the liberal tendencies and the national elevation after the political storms of 1848. In this connection should be mentioned also two poets among the most widely read, viz., *Elias Sehlstedt* (1808/74), who was much admired for his charming songs, and *K. A. Wetterbergh* (1804/89, pseudonym »Onkel Adam»), who wrote short home sketches of a high value.

The realistic tendencies of the century found expression in the ever increasing predominance of prose in literature. It was especially the novel, which by the romantic authors and above all by Almqvist, had received that greater development that now began its flourishing period; but having before been historical, exotic, or phantastic, it now, in the age of the *bourgeoisie*, comes down to every-day

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life. *Fredrika Bremer* (1801/65) took her model from those English novelists who paint the home-life of the eighteenth century. Her first production was »Teckningar ur hvardagslifvet» (Home-life Sketches), characterized by an idealistic, somewhat sentimental tone; but at the end of her life she devoted herself to tendential novel-writing. She sought to advance the humanitarian ideas of the time, and especially the emancipation of women, and thereby gained a fame outside of Sweden that equaled, if it did not surpass, that of Tegnér. There appeared many other male and female novelists, whose greatest merit it was to write for and about our people. Their aim was rather moral than esthetical. At the same time that Fredrika Bremer published her novels, *Sofia Margareta von Knorring* (1797/1848) pictured the higher social classes, and *Emilie Flygare-Carlén* (1804/92) gained great celebrity by her sketches from the fishermen's life on the coast of Bohuslän.

A deep appreciation of home-land nature, and a warm love of the people are distinctive traits of the new and significant tendencies in poetry aroused by *J. L. Runeberg* (1804/77) in Finland. Runeberg is a realist in the best meaning of that word, and he has received his epical limpidness in part from the calm, sad, Slavonic »folksongs», and in part from the harmoniously beautiful world of old Greece. In some of his works his intimate knowledge of Goethe, Byron, and Almqvist are clearly discernible. Above all he loves to portray the scenery and people of Finland, as he has done especially in his great epic »Älgskyttarne» (The Elkhunters), which in beauty can be compared with Goethe's »Hermann und Dorothea». He is entirely original in his »Fänrik Ståls sägner» (Tales of Ensign Stål), a collection of songs depicting the war of 1809. The poet here gives us a series of war-pictures, or rather, a gallery of heroic types charged with idealism, a profound moral view of life, and so deep a patriotic love that both to Finns and Swedes the Tales of Ensign Stål have come to be something more than mere perfect poems, their love to them being inseparable from the love of their countries. The first edition of his collected writings was published in 1870 by *C. R. Nyblom* (born 1832) who, besides, has issued collections of poems of his own as well as translations from classical and modern poets.

Among Finnish authors using the Swedish language should be mentioned also *Z. Topelius* (1818/98), whose gentle lyre is much beloved in Sweden, and whose »Fältskärens berättelser» (The Surgeon's Tales, romantized pictures from the history of Sweden and Finland) is the favourite book of Swedish young people.

Runeberg has formed no school. He filled alone the great vacuum in our literature at the middle of the nineteenth century; and when, after 1850, his lyre sounds but rarely, little is to be said about the poetry of that period. To be sure, *Viktor Rydberg* (1828/95) had by the publication of his novel »Den siste Atenaren» (The Last Athenian) attracted general attention, but it was only gradually that he obtained his position as the spiritual leader in modern Swedish literature. The last fifteen years of his life he was recognized as the foremost among living Swedish authors. Rydberg was long known and admired as a writer on esthetics, mythology, religious philosophy, and as a champion for a noble humanity and an undogmatic Christianity. It was only late that he appeared as a lyrical poet, but his poems belong to the very jewels in the treasury of Swedish poetry. Cast in a perfect classical form and stamped with Germanic earnestness, they contain meditations upon the deepest questions of life. As exponents of idealism are to be mentioned at the side of Rydberg also Count *C. Snoilsky* (1841/1903) and *C. D. af Wirsén* (born 1842), both lyrical poets with great formal power. Snoilsky, known especially by his exquisitely chiseled sonnets, has gained very great popularity through his patriotic epic-lyrical songs »Svenska Bilder» (Pictures from Swedish history). A religious feeling pervades all the poems of Wirsén.

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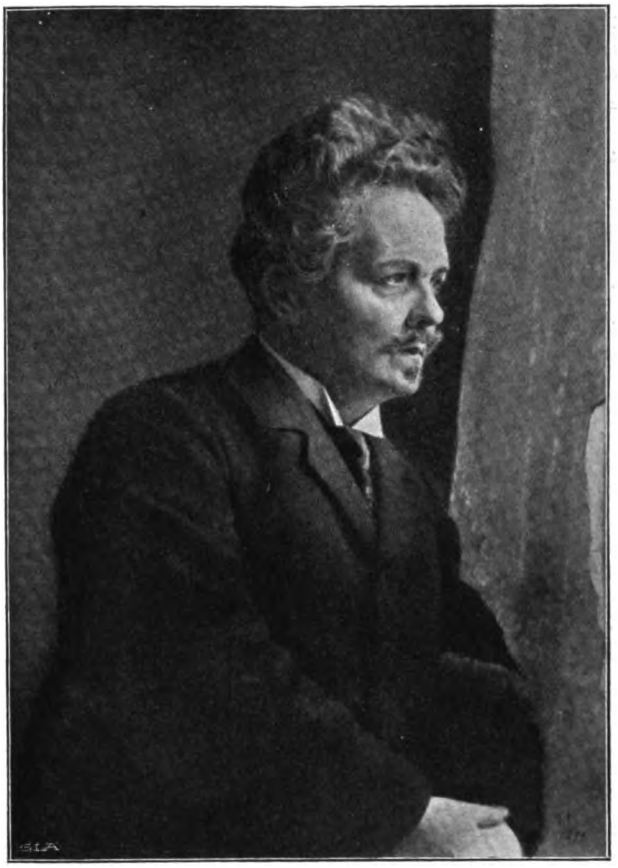

August Strindberg. Photo. Bröderna Andersson, Stockholm.

At the side of idealism there appeared from the year 1879 a realistic tendency. *August Strindberg* (born 1849) in his novel »Röda Rummet» (The Red Room) impressed upon literature a realistic stamp, and thereby gave rise to a violent literary feud. This realism deviates in more than one way from the realism of contemporary French authors. To Strindberg and to other Swedish authors of his school the form was of but subordinate significance; the main thing was to expose the ideas for which the battle was waged. Strindberg published a whole series of brilliant works, such as »Hemsöborna» (The dwellers at Hemsö), a superior sketch from the coast-life near Stockholm; the collection of novels called »Svenska öden och äfventyr» (Swedish Events and Adventures), and »Giftas» (Marrying), the dramas »Mäster Olof», »Fadern», »Brott och Brott» (Crime and Crime), and »Folkungasagan» (The Folkunga Tale), as well as a dramatic cycle about the Vasa dynasty. As a dramatist Strindberg stands foremost in our literature. His pictures of historical persons in his dramas are, however, often far from being true to history. — The life of the peasants and the middle classes is dealt with by one of our most industrious and most read modern writers, *G. af Geijerstam* (born 1858), who has also written comedies of good success. — But the shining period of realism was very short. Two of the most prominent representatives of this literary movement, *Anna Charlotta Leffler*, duchessa di Cajanello (1849/92), and *Victoria Benedictsson* (1850/88, pseudonym »Ernst Ahlgren»), died early.

Many young poets stood forth in opposition against the realistic school. *V. von Heidenstam* (born 1859) at first fought against the great lack of imagination and vital joy that characterized the prevailing school, and published a greatly imaginative collection of lyrical poems and romances displaying highly coloured pictures from the variegated life of the Orient. His later works — as, for instance, the historical cycle of novels, »Karolinerna» (The heroes of Charles XII) — are inspired by love of the scenery and history of Sweden. Simultaneously with Heidenstam also *O. Levertin* (born 1862) broke with realism. His imagination has been fructified by medieval mysticism, and there is something of a pre-

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raphaelite in his poems, even when in him, as in contemporary French authors, an esthetical sensualism is mingled with spiritualism. In his latest prose works of scientific or novelistic contents his tone is more sound, while at the same time his art is perfect.

One of our most national poets is *G. Fröding* (born 1860), who, without allegiance to any certain school, paints Swedish scenery and folklife with matchless freshness and humour. His inspired lyrical songs are unique for spontaneous style and intense feeling. In masterly handling of the language as well as of rhymes and meters he is without doubt unexcelled; in our literature he has his equal only in Bellman.

Selma Lagerlöf (born 1858) stands in the foremost rank of Swedish prose-writers. Her novels are distinguished by something of the simplicity and clearness of the classical epic. Her imagination is inexhaustible, her conception in a high degree poetical and spiritual, and her psychological intuition of rare power in Swedish literature. After her may be mentioned also a few other living authoresses, viz.: *Ellen Key* (born 1848), who has created attention by her treatment of social problems; *Helena Nyblom* (born 1843, a Dane), who in her mother-tongue has written lyrics, but in Swedish, sketches and sagas; *Alfhild Agrell* (born 1849), dramatist; and the novel writers *Sophie Elkan* (born 1853) and *Hilma Angered-Strandberg* (born 1855).

Selma Lagerlöf.

Among the more important authors of our days may be mentioned also: *A. T. Gellerstedt* (born 1836), an original miniature painter; *K. A. Melin* (born 1849), a deserving lyric; *A. U. Bååth* (born 1853), who has depicted rural scenes in Skåne and old Norse life; *D. Fallström* (born 1858), lyrical poet; *A. V. Lundegård* (born 1861), novelist; *A. Karlfeldt* (born 1864), lyrical poet with warm feeling and folk-humour; *F. Hedberg* (born 1828), dramatist, like his two sons *T. Hedberg* (born 1861) and *K. Hedberg* (born 1867); *P. Molin* (1864/96), spirited singer of the people and scenery of Norrland; *P. Hallström* (born 1866), distinguished especially as a sketcher; *H. Söderberg* (born 1869), novelist and »causeur»; *K. E. Forsslund* (born 1872), sketcher of nature and rural life; *G. Jansson* (born 1866), a distinguished narrator; and *A. Hedenstierna* (born 1852, pseudonym »Sigurd»), sketcher of folk-life and satirist. A style of writing which has become very popular nowadays is the provincial literature. It depicts the peasants from their own point of view, and partly in their own idioms. Among authors cultivating this style the most known are *F. A. Dahlgren* (1816/95, pseudonym »Fredrek på Rannsätt»), and *A. Bondeson* (born 1854).

Besides the authors above treated of, a number of new poets have arisen during the last years, too young as yet perhaps here to receive special mention, but also these witnessing nevertheless of the pleasing fact that Sweden's polite literature in our times has entered upon a new period of golden days.

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9. THE FINE ARTS.

A national conception rather early made itself known in our country within the precincts of Architecture and of Industrial art, but it was not until the 18th century that Sculpture and, in a still higher degree, Painting began to shake off the bands of a prevailing foreign influence. It is from this time that Swedish national art derives its origin. The originality of Swedish Music is, in some departments at least, incontestable, and vocal music has in our country attained a high degree of perfection.

Architecture.

The history of Swedish architecture begins with the establishment of Christianity in the country during the 11th century. The primitive architecture, of whose productions we find examples in the small country churches of Vestergötland, experienced its first tendency to elevation at the erection of cloisters in various parts of the country by the Cistercian order. The church of Varnhem (illustr. p. 73) in Vestergötland — preserved from one of those foundations — is the chief memorial of **Romanesque** art in Sweden and is secondary only to the splendid cathedral of Lund (illustr. p. 266), a construction from the twelfth century, comparable to the Rhenish cathedrals.

Most plentifully, however, the creations of Swedish medieval art are to be found in *Gotland*. A whole-cast monument of this art is the city of *Visby* with its mighty town-wall (illustr. p. 72) — still in good repair — its streets, its houses, and its many churches, which latter, with one exception, certainly are fallen into ruins but yet can be seen in a state of preservation complete enough to make clear what once they were. These churches, belonging to the eleventh and following centuries, the fourteenth inclusive, and representing all the phases of medieval architecture except the late gothic style — are each of interest by their original composition. The oldest is the Helgeand Church, a peculiar central construction; the most beautiful is considered to be St. Catherine (illustr. p. 410), built in the early gothic style. In its rural districts, Gotland possesses quite a treasure of churches, in perfectly good repair, from the same ages. Unpretentious in size, they excite your surprise by their original designs, their well calculated proportions, and their rich and characteristic details. The typical ones are independent variations of the romanesque basilica and of the gothic hall-church with columns. The most beautiful churches date from the thirteenth century and represent a transitional style uniting the imaginativeness and elasticity of the gothic with the calm plasticity of the romanesque style — a style of architecture so original and so artistically put into effect that it is entitled to a name of its own: the **Gotland style.**

Among the works of **gothic architecture** on the mainland ought to be mentioned: the splendid Cathedral of Linköping — begun during the romanesque time but completed as a gothic hall-church, in the details of which Gotland prototypes have been traced *; further, the Skara Cathedral and the Church of St. Bridget's nunnery at Vadstena (illustr. p. 75 and 264) — these, like all the other edifices mentioned above, built of cut stone. A romanesque brick church will certainly be found here and there in Skåne, but it was only with the gothic style

* Cf. G. Lindgren's History of Swedish architecture in the »Book of Inventions».

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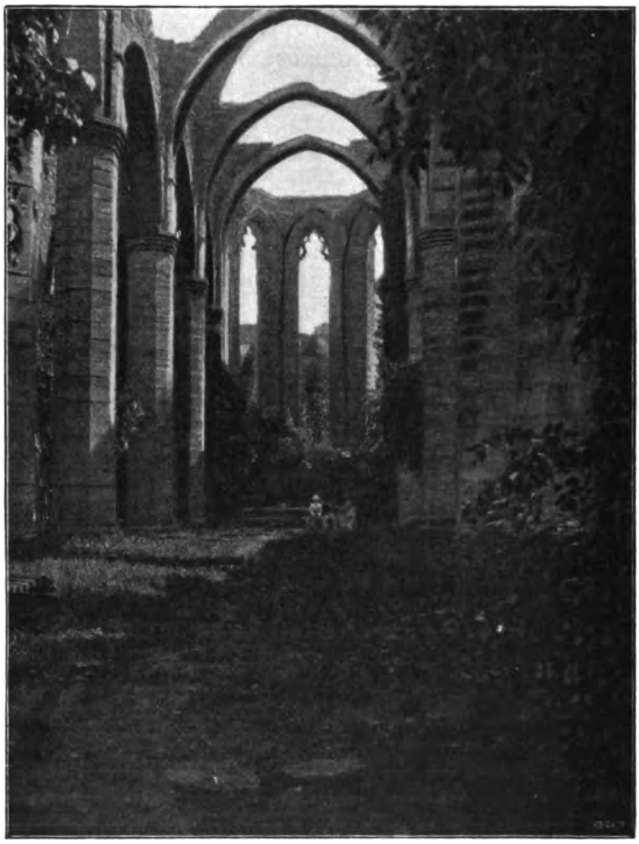
that — by north German influence — a real brick architecture arose, which in Southern Sweden has left the richest specimens of its production and in the central part of the country displays more unpretentious but more independent forms. A combination of stone and brick architecture exhibits itself in the foremost medieval building of Sweden, the Uppsala Cathedral (illustr. p. 261), a nobly proportioned structure, whose prototype is taken from Northern France, with most of its details carried out in stone but the masonry framework in brick. Many Swedish medieval churches, amongst which specially some small country churches in Roslagen, are adorned with beautiful and characteristic painted vaults.



Ruins of S:t Catherine, Visby. Photo. K. SIDENBLADH J:R.

Of profane medieval architecture, Sweden has comparatively few remains; amongst such may be mentioned the so-called old Pharmacy in Visby and the Castles of Vik in Uppland and of Glimmingehus in Skåne. *Wood architecture*, which preceded stone architecture, subsisted at the side of it, and no doubt has exercised an essential influence on the latter, was probably highly developed during the whole of the Middle Ages, and was related to Norwegian art of that kind, but only very few remains have come down to our time; one, however, is the so-called Ornässtugan in Dalarne (illustr. p. 78).

The Renaissance, like the preceding new epochs of art, arrived late in Sweden; it does not make its appearance till in the second and third decades of the sixteenth century and is contemporary with the Reformation and the political emancipation by Gustavus Vasa. If the renaissance and the protestantism, in general, mark a transmission of the architectural center of gravity from the religious sphere to the profane one, this will especially be the case in Sweden, where ecclesiastic property about that time was in great part transferred to the Crown, so that many a cloister building had to provide the stone material of the castles erected by Gustavus Vasa and by his sons. These castles, being partly continuations of medieval structures, partly completely new buildings, are the characteristic edifices of Swedish renaissance. To the former category belongs the chief of them: the Castle of Kalmar — an extensive and

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picturesque building, among the details of which especially the well (illustr. p. 77) is an interesting work of art; also Gripsholm at lake Mälaren (illustr. p. 80) — a medieval castle reconstructed during the renaissance and enlarged also during the following centuries; it forms a complex of buildings with an exterior quite simply made of brick but containing rich and picturesque interiors. Foremost among the newbuilt castles stands the beautiful Vadstena at lake Vettern (illustr. p. 79). Unfortunately, the old royal palace of Stockholm — also of medieval origin and perhaps the grandest work of Swedish renaissance — was destroyed by fire in 1697.

The first artists of the renaissance in Sweden were chiefly Germans and Dutchmen; after them a Swedish school by and by developed itself. Distinctive features of the style are: exteriorly, a simple effect produced by the bulk and enlivened by solitary details, amongst which especially the portals are of a superior prevalence; and interiorly, a decorative system, at times magnificent, at times of unaffected loveliness and often produced with the simplest means.

The few churches erected during that period (the end of the sixteenth century) are imitations of the gothic style.

The *wood architecture* inherited from the Middle Ages was further developed by the renaissance as well as by later epochs. Its best productions are the Belfries, often to be seen at country churches and revealing a constructive power brought to a high degree of perfection at the side of an artless but sensitive formative power. The same traditions are noticeable in sundry churches, e. g. that of Habo in Vestergötland, further in many peasant houses, especially in Dalarne, in the »Härbren» or larders peculiar to that province, in the so-called Björkvik Fatbur (larder), etc.

Doorway, St. James' Church, Stockholm.

The Baroque style has three phases of development in Sweden. The first covers the beginning of the seventeenth century and forms a somewhat modified continuation of the renaissance. To this era — *that of the early baroque* — belong several handsome country-seats, as for instance Tidö in Uppland and Leckö at lake Venern, a. o., as well as a number of palaces and houses in the towns, which at that time displayed a lively structural activity. Characteristic of the period is also an increased interest in ecclesiastical art, certainly resulting in sundry reconstructions and new buildings — amongst which ought to be mentioned the little, abundantly decorated German Church of Stockholm and the magnificent Church of Kristianstad, erected by Christian IV at a time when that town belonged to Denmark — but especially in decorative details: portals, sepulchral monuments, and movables with which old churches were fitted up. — A German trait of character has often put its stamp on the architecture of that age, especially on the burghers' houses, which mostly are architectonically decorated.

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The next era — *that of the later baroque* — coincides with the Era of Sweden's Political Greatness during the latter half of the seventeenth century. Castles and palaces — in which particularly the capital and the Mälar provinces now begin to abound — are erected on a scale hitherto unknown, and the previous, more serious character of style passes over into a lighter one with impulses chiefly from France but also from Italy. A grand, imposing design and excellent proportions are traits distinctive of the edifices, the details of which, however, sometimes are studied somewhat negligently. The foremost architects of the time are *Jean de la Vallée* (1620/96) and *Nikodemus Tessin, Sen.* (1615/81). The former has, amongst other things, completed the House of Nobles — the most representative building of the time (illustr. p. 82) — and erected the present Town Hall and other palaces of the capital. The latter in his works — amongst which should be mentioned the palace of Axel Oxenstierna (illustr. p. 199), that of the Bank of Sweden besides other edifices in Stockholm, the main part of the royal palace at Drottningholm (illustr. p. 88), the palace of Borgholm in Öland, still remainig as a magnificent ruin (p. 364), the palaces of Eriksberg and of Skokloster (illustr. p. 84), the latter carried out in collaboration with de la Vallée, and other larger or smaller country seats as well as the Cathedral of Kalmar — proves a versatile, talented artist understanding how to express in architecture, now a magnificent or seriously monumental character, now an idyllic, lovely one. Drottningholm certainly is a luxurious structure in French taste but most of Tessin's works bear the character of an unostentatious architecture modeled on Italian prototypes. This was further developed by his son, *Nikodemus Tessin, Jun.* (1654/1728), who was a co-operator at many of the later works of his father, and in this way rise was given to the *last era of the Swedish baroque.* It is contemporary with the European rococo but shows a somewhat deviating character and might be termed the *Tessinian* or the Royal palace-building period.

The erection of the *Royal palace of Stockholm* (illustr. p. 169) — a work by Nikodemus Tessin, Jun. — began on the site of the old one after the fire in 1697, and the work proceeded during the whole of the former part of the eighteenth century. This monumental edifice has outwardly more in common with the Italian high and late renaissance than with contemporary architecture. The plain, but ingeniously grand, and at the same time picturesque design, enhanced by the splendid situation, necessarily makes a mighty impression. The palace is also acknowledged to be, not only the chief edifice of Sweden, but also one of the foremost in the world. What effects Tessin knew how to draw even out of the interior is evident by the galleries and vestibules of the palace, among which the southern vestibule especially is striking by its genial composition, as well as by that of Drottningholm and by his own palace with its Italian garden design (illustr. p. 195). The Caroline mortuary chapel, joined to the Riddarholm Church, is a brilliant decorative work of his hand. Besides these, he has — in Stockholm as well as in provincial parts — handed down to posterity a great number of attractive works of architecture, amongst which also are to be found divine ones.

Of the interiors of the Royal palace, several were added after the death of Tessin; he did not live to see the completion of his masterpiece. These and similar parts in the royal country palaces, the delicately designed opera-house of Gustavus III — now pulled down — the Stockholm Exchange, and the inside of some churches, amongst which the magnificent Palace chapel, — constitute the chief productions of the rococo style proper in Sweden.

The following eras, that of Louis-Seize and of the Napoleon style, — in Sweden generally named after the Kings Gustavus III and Charles XIV — have chiefly left us interiors, the most remarkable of which are to be seen in the royal country palaces in the environs of Stockholm.

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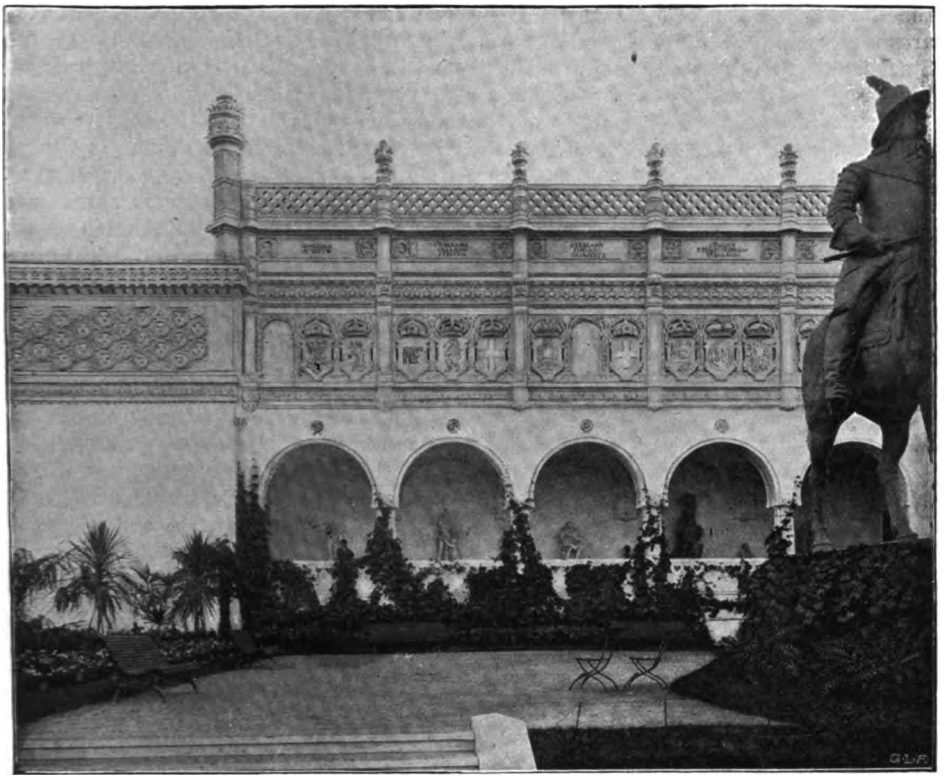

Stockholm Exhibition, 1897. Art Gallery.

Within ecclesiastical architecture, the seventeenth and eighteenth centuries in Sweden exhibit the introduction of the »central church type», to which Tessin, Sen., gave the initiative by the Kalmar Cathedral. These eras, moreover, enriched the churches with a lot of mostly magnificent sepulchral monuments and with additional chapels.

For Sweden, the **nineteenth century** began with great political misfortunes acting as a check also on architecture, and it is not until after the middle of the century that this art begins to rise again. The first prominent architect is the versatile and highly gifted *F. V. Scholander* (1816/81). With the humble means he had at his disposal he managed to impress a character on his works, amongst which the principal ones are the Technical High School (illustr. p. 343) and the Synagogue of Stockholm. His successor, *H. Zettervall* (born 1831), began his work with the restoration of the Lund Cathedral, which later on was followed by that of the cathedrals in Linköping, Uppsala, and Skara. The insight he had acquired of medieval architecture was put to the test in a great number of ecclesiastical as well as profane works of architecture. But he also knew how to utilize the various kinds of renaissance style, as for instance in the Malmö Town Hall, a State College in Stockholm (Norra Latinläroverket), and other edifices. Thus, he opened the eyes of his age to the practicability of other styles than the Italian renaissance, which, during the time immediately preceding, had been more or less narrow-mindedly employed, and thereby, as well as by his sense for the picturesque, he gave a new impetus for future

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times. Contemporaneously with and successive to him have been working the architects *E. Jacobson* (born 1839; palace intendant; the Scandinavian Bank in Stockholm a. o. buildings), *A. Dahl* (born 1835; the Royal National Library, illustr. p. 394), *A. Peterson* in Gothenburg (born 1835), *H. T. Holmgren* (born 1842; the University Palace of Uppsala, illustr. p. 89), *A. T. Gellerstedt* (born 1836) superintendant, and *C. Grundström* (born 1844), professor at the Academy of Arts, known through reforms in the instruction in architectonics.

Isak Gustaf Clason.

The last twenty years show an unmistakable rise in the development of Swedish architecture, which in our days may justly be said to occupy a very prominent position. The causes of this development — besides increased material resources — may be traced to widened views and deeper studies, especially of the medieval styles, but also of Art in general. Our architects have got into the custom of studying, not only Italy, but also the other countries of Europe, nay even America, and — first and last — the monuments of their own country — no doubt humble but nevertheless of great importance to us. The general use of natural stone as a building material, to the introduction of which practice *A. W. Kjellström* in Örebro (born 1834) has given important impulses, is a manifestation of that progress and at the same time one of the principal causes of it.

The merit of these reforms must above all be ascribed to *I. G. Clason* (born 1856), professor at the Technical High School and the creator of several works of architecture, beautifully carried out from an artistical as well as from a constructional point of view. A specialist on the department of the noble private building — of which the Hallwyl palace in Stockholm is the foremost specimen — he has in the edifice which is being erected for the North Museum (illustr. p. 388) solved a monumental problem, and that most happily, by the utilization of models from Swedish renaissance palaces. Vernacular prototypes from various epochs have besides successfully been worked out by *Agi Lindegren* (born 1858), *F. Lilljekvist* (born 1863; restoration of the Gripsholm palace), *G. Lindgren* (born 1863; the Stockholm Tattersall), and other artists; partly they have been made use of by *A. Anderberg* (born 1860), for the Royal Opera-house (illustr. p. 431). *F. Boberg* (born 1860), is the head-representative in Sweden of the modern, naturalistic school, trying to free itself from the historical styles and to create new forms. He, as well as other Swedish artists who more or less embrace the same tendencies, receives good impulses from contemporary English and American art. Boberg has recently completed the new General Post Office Building of Stockholm. Besides, he seems to be aiming at clothing the structures of industry in an artistical garb, which has been effected in the buildings of the Stockholm gas-works and electricity-works; but he has also acquitted himself happily of decorative tasks, which was evidenced by the Art hall

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at the Stockholm exhibition of 1897 (illustr. p. 413). Among other architects of the age may be mentioned *A. Johansson* (born 1860: the Houses of the Riksdag, illustr. p. 181, and of the Bank of Sweden, *E. Lallerstedt* (born 1864; the Academy of Arts), *L. Peterson* (born 1853; the Artists' House in Stockholm), *G. Wickman* (born 1858; Banks, etc.), *E. Josephson* (born 1864; barracks, illustr. p. 218, a. o. buildings); the Gothenburg architects *H. Hedlund* (born 1855), *E. Thorburn* (born 1860), and *Y. Rasmussen* (born 1860; the Mausoleum of John Ericsson, illustr. p. 903); *F. Ullrich* (born 1860) and *E. Hallquisth* (born 1862), People's Palace, Stockholm; and *G. Hermansson* (born 1864; buildings in Sundsvall). *F. Sundbärg* (born 1860) and *P. Hallman* (born 1869) have aimed at an artistical development of the town designs.

To divine architecture the chief contribution has, during late years, been made by *C. Möller* (born 1857) — active also in the profane sphere — by the Church of St. John in Stockholm, finished already in 1890 (illustr. p. 268). Of the remaining, far from insignificant production in the ecclesiastical domain, may be held out, from an artistical point of view, several decorative works by Mr. Lindegren, mentioned above, and other artists; moreover, some smaller churches, whereas most of the new buildings achieved — perhaps chiefly on account of unfavourable conditions — only seem confirmatory of the fact that divine architecture, in our country as in others, has not in its development kept pace with the profane one.

Leaving the historical point of view out of consideration, we must maintain that the many *restorations* brought about lately have proved a matter of great signification for Swedish architecture, in having offered a spacious field of work for the artists, and having contributed towards awakening an interest in our old works of architecture, and deepening the knowledge about the art styles of our own country. Some have been carried out successfully and with discretion, whereas others have called forth a strong skepticism against ideas of restoration that had previously been generally accepted.

Sculpture.

Hand in hand with Christianity, general European culture makes its entry within our boundaries. Architecture marched ahead and built churches of romanesque medieval structure, and it is for decoration of the churches that primitive sculpture first is taken into its service. This sculpture applied itself chiefly unto baptismal fonts and sepulchral monuments, which — as significative of man's entrance on the stage of life and exit from it — were decorated with saintly images carved in stone. Later on, came portals with stone figures, as on the Cathedral of Uppsala and several Gotland churches; images in the interior, as for instance on the corbels of the chancel aisle in the Uppsala Cathedral; then also bronze works, as shrines for relics and whole altar-pieces, e. g. from the Church of Broddetorp in Vestergötland (now in the National museum). During the reign of the Gothic style in the latter part of the Middle Ages, wood sculpture flourished and created a great number of tabernacles with carved figures, painted in natural colours or else gilt, amongst which were seen images of the apostles and saints of Sweden, as for instance Sigfrid and Botvid, King Eric the Saint, St. Bridget, and her daughter Catherine. The largest and most remarkable product in that branch of wood-carving is the wellknown group of *St. George and the Dragon*, which Sten Sture, the elder, the great »protector of the Realm», caused to be set up as a memorial of the victory over the Danes in 1471. Like a great many of the altar works above mentioned, it is now treasured up in the National Museum. All these medieval objects of art are probably carried out by foreigners, chiefly Germans and Dutchmen.

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The same continued to be the case also during the 16th century. By and by the medieval forms vanish before the new style brought into life by the enthusiasm for the Antiquity — the Renaissance. In its first German-Dutch phase it is in our country denominated the Vasa style (1520/1650). Though we look upon it as a sort of renaissance, there are, however, only few antique elements to be seen about it, with the exception of the structure of the architectonic framework constituting a support for the plastic, mostly realistic, figures. But it must be taken into consideration that the works of art were chiefly sepulchral monuments and, above all, royal ones. Its first and finest flourishing this imagery art displayed in the reign of Johan III (1569/92), the great lover of art.

Already in the life-time of Gustavus Vasa, the newly discovered memorial of his first wife in the cathedral of Uppsala was no doubt ordered from the school of Michel Colomb at Tours (France) though it was never set up and has since been forgotten. It exhibits the finest real renaissance ornamentation to be found in our country. But Johan III ordered *Willem Boy* to make the beautiful memorial of Queen Katarina Jagellonica; and the magnificent monument in the same church of King Gustavus Vasa and his two later consorts is by the same master. Besides, there is another work of the same artist in the cathedral of Strengnäs: the touching sepulchral stone of Johan's little daughter, Isabella. At Uppsala there are yet another couple of remembrances from King Johan, namely the gilt silver-shrine of King Erik the Saint, which he caused a Danish goldsmith, *Hans Rosenfeldt* by name, to work out in renaissance style, since the old medieval shrine had disappeared; as also the sepulchral monument of Johan himself, carried out at Danzig (1604), and, after many vicissitudes, set up in 1818 in a form which was adjusted in 1892.

As specimens of private people's sepulchral monuments during the Vasa period may be remembered that of Gustaf Banér and his wife at Uppsala (signed *Aris Claesson, Haarlemensis*, 1625); that of Erik Soop and his wife at Skara (1637, by *Peter Keyser* in Amsterdam); and that of Gabriel Oxenstierna and his second wife in the church of Tyresö (after 1640). At the very end of the period, was the south portal of the Church of St. James in Stockholm achieved (illustr. p. 411), embellished with images of Moses and James the Elder — one of the most sumptuously decorated portals in Sweden.

After the middle of the 17th century follows the time we call the Caroline era, and the style now making its appearance (1650/1720) is the Baroque, which in the department of sculpture has features of its own just as in that of architecture. It distinguishes itself by a passionate taste for movement, displaying itself in wavy lines, flowing draperies, and exaggerated attitudes, which all is due to the sovereign influence of painting upon the other arts. Our victors, returning from the Thirty Years' war, brought this change of style home with them from the Continent. They built palaces in the baroque style and provided them with hangings and furniture, pictures and statues, which were partly spoils of victory, partly executed after foreign models. In all this, sculpture had the smallest share, to be sure; but mighty sepulchral monuments were continuously erected — now in baroque — and busts are to be seen that were made in our country. But the constructions which also proved favourable to sculpture, were the large royal palaces, foremost that of Drottningholm, then also that of Stockholm. A couple of stately baroque monuments are to be seen in the Cathedral of Uppsala, viz. that of Count Dohna (signed *Verbruggen*, Antwerp 1674) and that of Bengt Oxenstierna (from a sketch by *Nik. Tessin, Jun.*, about 1690). A portrayer in marble was *K. Schröder*, a German by birth, who in 1695 modelled and cut a bust of Charles XI (the University of Uppsala). Amongst those who plastically decorated the palaces may be mentioned the Frenchman *R. Chauveau*, who worked here 1692/1700, and *B. Precht*, a German, who in 1672

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settled in Sweden (died 1730) and whose work chiefly consisted in decoration of rooms, e. g. the famous bedchamber of the Queen at Drottningholm, but also in altars and church pulpits — the most excellent is the pulpit of Uppsala Cathedral (1707, from a design by Nik. Tessin, Jun.) — all in flourishing baroque.

By and by this style is superseded by the French fancy-style — the rococo — which, having been introduced from France together with French taste and French literature under the influence of Queen Lovisa Ulrika, predominated for some time, to be replaced, about 1770, by the modern antique style, which then subsisted till about the end of the century. This period, too, is with us ushered in by foreigners but this time exclusively by Frenchmen, two of whom have got their names connected with Swedish history of art. One is *J. P. Bouchardon*, who settled here in 1741, and died here in 1753; he stands foremost of the two, he made a bronze bust of Charles XII — the first plastic effigy of the warrior King — and several bronze decorations for the royal palace of Stockholm, e. g., the »putti» supporting the lanterns of the great entrance. The other one was *P. L'Archevêque*, who lived here 1755/77 and, besides decorative works in the royal palace, made the statues of Gustavus Vasa and Gustavus Adolphus in Stockholm, of which, however, neither proved a great success; he was the first director at the Academy of Arts, reorganized by Adelcrantz, but his greatest merit by far is to have given Sergel his first training.

Johan Tobias Sergel (1740/1814) became namely »the foremost artistical genius of Sweden». He was a Stockholm child but born of German parents. At an early age he was apprenticed to L'Archevêque, whom he assisted in his work at the chapel royal and the statues above mentioned, all while studying at the Academy. At last, he managed to go to Italy, where he was staying in Rome during 1767/78 and made acquaintance with the Antiquity. Though he could not get to study what according to modern opinion are the best samples of antique sculpture — the productions from the golden days of art — he, however, was most deeply impressed with the best that was then offered to him. He now made it a rule, to which he kept all his life, »to render Nature according to the principle of the ancients». But how strongly, in spite of this, he insisted on immediate life, is evident by his splendid Faun (1770) as also by the Diomedes, Mars and Venus, and Amor and Psyche, which were achieved in Rome, as well as by the Otryades (in Paris 1778). — When he returned to Stockholm, called home by Gustavus III, there was put an end to his creating of statues; all his time was now taken up with making busts and medaillons of the members of the royal family and a number of distinguished men in Sweden. But also on this field he has achieved a grand deed, for which posterity owes him gratitude, inasmuch as by his art productions — noble also in this department — we now know almost the whole circle of those people of note — in state affairs, in literature, and in art — who surrounded King Gustavus III. However, he received some charges of a more general and free kind, viz., the large group of Axel Oxenstierna and History (in the royal palace) — the first successful attempt at

Johan Tobias Sergel.
Self-portrait.

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representing a historical personage in his real character —; further, the memorial of Cartesius, genial in conception as well as in execution, and the large wall-sculpture of the resurrection of Christ — both in the Church of Adolf Fredrik in Stockholm —; also the celebrated bronze statue of Gustavus III, likewise as the statesman above mentioned, represented in the costume of his own time (1790, unveiled in 1808). These last named works were the outcome of his having been recalled, and that was no mean one, but still he was intended for something else by his genius. He was the first who, standing on an ideal basis, broke with the baroque and the French traditions, and he felt a calling to carry that movement forward without too strong a tendency towards the objective coldness of the Antiquity. But it was not vouchsafed to him to carry the work out. He became a Protesilaos, — sacrificed at the beginning of the contest but not allowed to partake in the siege of Troy. Nay, his fate is more tragic still, for he does not fall but must at a distance behold the continuation of what he himself has begun while being sent out of the battle and soon forgotten by the world. His standing as a witness to this development and encouraging the partakers in it with a mind so noble and altogether ungrudging, cannot but intensify our sympathy with him and call forth the respect of posterity.

A special kind of sculpture, most eagerly practised in our country during the 18th century, was medal-engraving. Foremost in this art stood *J. K. Hedlinger* from Switzerland (lived in Sweden 1718/45, with one or two interruptions for travels to the South), a master, who at his time was the chief one in Europe and who executed many medals reminding one of Grecian excellence. He was succeeded, first by his clever disciple *D. Fehrman* (1710/1801) and then by a follower of the latter, *G. Ljungberger* († 1787).

Continuing to live on the traditions of Sergel, sculpture kept up rather well during the first half of the 19th century while the other arts were languishing and declining. The first followers of the art of Sergel were also his disciples — first *E. G. Göthe* (1799/1838), who, however, was more strongly impressed by Canova than by his manly, Swedish teacher, e. g. in the effeminate Bacchus (the National museum); then *J. N. Byström* (1783/1848), a superior competitor to the former, who spent the later part of his life mostly in Rome, distinguished himself in the sensually luxurious, and became a master in manipulation of the marble: see, for instance, Juno with the child Hercules at her breast.

Of quite a different character was the third and foremost among the sculptors during the first half of the 19th century, *B. E. Fogelberg* (1786/1854), who against the ideals in the world of gods of the Antiquity — worn out during the three centuries of the renaissance — dared to set up new, original, nationally Scandinavian ones, sprung out of a sound, energetically creative imagination. His success was also acknowledged by the respectful judgment of Thorvaldsen about his Thor (in Rome 1842). Moreover, he has embellished our capital with a couple of noteworthy statues: that of Birger Jarl and of Charles XIV, as well as Gothenburg with that of Gustavus Adolphus. His imitator, both in general tendency and in monumental sculpture, was *K. G. Qvarnström* (1810/67), of which facts evidence is given by his mythological group of Loke and Höder as well as by his statues of Tegnér, Engelbrekt, and Berzelius. Contemporary with him was *J. P. Molin* (1814/73), who, after getting his first education in Copenhagen, continued his work in Rome and, finally, by his Wrestlers acquired a fame which was not in any way disturbed by the remarks made against his statue of Charles XII (1868) and against his Fountain (1873).

Among the late sculptors remain to be mentioned: the successor of Molin at the Academy, *J. F. Kjellberg* (1836/85), who, after having finished his studies at home, spent his time partly at Paris, where, amongst other things, he made a frieze relief — Boys playing at leapfrog —, partly also, for a considerable time,

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in Rome, where his chief work was »A Faun playing with his younger brother». In Sweden, he was at work for many years at the memorial statue of Carl von Linné (unveiled in 1885), besides which he modeled several portrait medaillons and busts; further, *A. Carlson* (1846/78) — a disciple of Molin — who in Gothenburg achieved a large frieze, »Baldersbrenna», in which the ancient Scandinavian world of gods was represented, but, perhaps, more known still for his bronze Vase with dancing bacchants, exhibited in Paris 1878; then, also in the town of Gothenburg, *I. Fallstedt* (1848/99), who with signal success mostly devoted himself to portrait sculpture and, moreover, made a statue of John Ericsson; and — last but not least — *P. Hasselberg* (1850/94), one of the foremost, who studied in Paris and exhibited his first statue, »Le charme», in 1880, but was made famous by his second work, The Snowdrop (1881), and has since, again and again, been glorifying woman as »a symbol for the life of nature»: in »La grenouille» (1890), The Waterlily (1893), etc. One of his celebrated works is The Grandfather (in the park of Humlegården, Stockholm), besides which he has sculptured several portrait busts distinguishing themselves for the pronounced characteristic they present.

The Snowdrop.
By P. Hasselberg.

Also a couple of medal engravers belong to the deceased in the latter part of the 19th century. One of them is *J. E. Ericsson* (1836/71), who studied his art with Conradsen in Copenhagen and then made good medals as well as small, pretty sculptures, statuettes, and groups. The other one was Mrs. *Lea Ahlborn* (1826/97), who revived medalurgy, that, since the time of Ljungberger, was somewhat deteriorated. Though a woman, she, however, enjoyed the distinction of being designated to the rather important function of engraver at the Royal Mint after her father, L. Lundgren.

Among sculptors now living ought to be named foremost *J. Börjeson* (born 1835). After having tried his fortune in various departments of life, amongst which as a dramatic singer, he studied sculpture, first at the Academy of Stockholm, then, for a length of time, in Rome and Paris, and began his independent activity, partly with works of imagination, partly with genre figures (e. g., Capri Boy, Passetemps) and, with his stately sketch for the Sten Sture Memorial, pointed out the specific art which was going to be the chief object of his future activity — the monumental statue. In 1881, he began with the Holberg statue in Bergen (Norway), followed by the Geijer monument (with »The Thought») in Uppsala (1888), Axel Oxenstierna (1890), Scheele (1892), and Nils Ericson (1893) — all in Stockholm. Then came the colossal equestrian statue of Charles X Gustavus in Malmö (1896), Charles XI in Karlskrona (1897), another enormous equestrian statue, of Magnus Stenbock in Helsingborg (1901), and the John Ericsson monument in Stockholm (the same year) — the only one to which serious objec-

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tions have been made. Such a list of monumental works can be shown by no other Swedish sculptor. To these may be added several busts as well as realistic and allegorical figures and groups. Next to him should be mentioned the medal engraver *J. A. Lindberg* (born 1839), who, after studies at the Academy of Stockholm and several good attempts in his art, went to Paris in 1877, where he learnt the superior French medalurgy, which he then introduced in Sweden. The first new medal sent home by him from Paris was the one struck in memento of the jubilee of Uppsala university (1877), and this was followed by a whole series of medals in remembrance of solemn occasions and illustrious persons as well as by portrait medaillons of famous people. — In his steps follows his son, *E. Lindberg* (born 1873), who likewise has studied in Paris and already in his youth carried out beautiful works and has been commissioned to engrave the prize medals of the Nobel Foundation. Further is to be noticed *E. Brambeck* (born 1843), who, amongst other works, has executed Eve at the corpse of Abel, and the Temptation of Christ (1882) — later on, sculptured in marble for the church of Helsingborg — and for a private person, two friezes representing the myth of Amor and Psyche, as also arts and sciences allegorized by »putti» with emblems. Chronologically then follows *J. T. Lundberg* (born 1852), who, after studies at the Academy of Stockholm, carried out some works that enabled him, during some time, to continue and accomplish his studies in Paris and Rome. Works made by him are — after some smaller, genre-like figures — the group of The Foster-brothers (1888), ordered by the Swedish and the Danish States; relief and frieze sculptures for the three portals of Uppsala Cathedral (1892/94); St. George, and Spring — marble statues for the palace of the Heir presumptive (1895/96) —; the bronze group Industrial Art (1897) for the portico of the National Museum; the marble group of The Wave and the Shore (1897), belonging to H. M. the King; Grief, in marble (1897), in the National Museum; bronze statue of Olaus Petri, erected in 1898 at the East wall of the church of »Storkyrkan» in Stockholm: Icarus, plaster statue (1900), one of his best productions; and Svea (personification of Sweden), ordered by H. M. the King; to which, furthermore, have to be added sepulchral monuments, medaillons, and busts. Of the same age is *G. Lindberg* (born 1852) — a disciple of Kjellberg and of the Academy — who, during his stay in Paris between 1880 and 1890, was strongly impressed with the style of Hasselberg and, in his manner, modeled The Wave (1885) and, besides that, executed some decorative sculptural works. *V. Åkerman* (born 1854) has, amongst other things, exhibited Wreckage (1893) and minor bronze works. Last in the row of remarkable sculptors comes *Chr. Eriksson* (born 1858), who, departing from industrial art and decorative sculpture, during his time of study in Paris with success also attempted clay modeling and marble sculpture, which at last culminated in the colossal high relief of Carl von Linné in the National Museum. But still he has not forgotten his original taste for industrial art, which has revealed itself in several silver objects of art as well as in smaller bronzes, besides which he sculptured the bronze group Study of Art for the portico of the National Museum. — Of late, two young sculptors have attracted attention: *C. Milles* (born 1875) through his original and imposing sketch to a Sten Sture Monument, and *A. H. Wissler* (born 1869) through his bronze group (fountain) »The Fishing Tor», now adorning the Adolf Fredrik square in Stockholm.

Here ought also to be mentioned Mrs. *Agnes Kjellberg-Frumerie* (born 1869), one of the first women in Sweden who with success have devoted themselves to sculpture but who has now been followed by several, some of whom during late years have occupied a prominent place at the Academy of Art exhibitions.

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Painting.

In Sweden, just as everywhere else, the first attempts in the art of painting appeared in connection with architecture, whose works were adorned with paintings of a decorative kind. As we have seen, this was also the case with sculpture; but the productions of this art were, naturally enough, met with more rarely than those of painting, in consequence of their requiring more work and being more expensive than the latter. If a church was built of natural stone, painting was rather out of question, except for the windows, and there plastic ornamentation proved more to the purpose. If again the church was constructed of brick and the walls were plastered inside, it became a matter of course to decorate these plastered walls with colour, for white-wash never occurred till the 17th century when the old paintings were washed over. And just as natural it seemed not to make use of ornaments alone, but also of representations of figures, the contents of which were biblical or allegorical, at times mixed up with the creations of popular fancy. This was, for instance, the case in the archbishopric at the end of the 15th century when under the sway of Archbishop Jakob Ulfsson, for then very nearly every church in Uppland and the districts north of this province was decked out with figure-decorations, which in our days, at many places, have been discovered and called forth. If the church was built of wood, as was the case in neighbourhoods abounding in forest but otherwise poor, it proves of still greater necessity to paint the inside while shingling the outside. Thus, for instance, the church of Råda in Vermland (from about 1320) has both the chancel and nave decorated with excellent figures. This was also the case with the church of Vrigstad in Småland (pulled down in 1865). Gotland was particularly rich in stained windows with biblical figures, of which decoration much still remains. As an example may be mentioned the beautiful Dalhem church near Visby. All these images are of historical value as regards culture, though artistically they may not be worth much. In their primitive innocence, they are, however, always touching evidences of a pious mood and a zeal to make the house of God pleasant for the congregation. Besides, here the details are not of so great a signification as the entirety, not the smallest part of roof or vault, walls or windows generally having been left untouched by the desire to ennoble the construction by means of form and colour. In that respect, the ornaments and the choice of colours, as a rule, prove of a most predominant interest.

Jakob Ulfsson died in 1521, and as long as he lived, the decoration of the churches was, no doubt, carried on in the same way as before, and much the same kind of painting was employed in palaces and other dwelling-houses, although with some change of the subjects when concerning profane purposes. With the accession of King Gustavus Vasa (1523/60) and the beginning predominance of the Vasa style in all the new palaces, a decided change of style ensued also in the art of painting. The sleeping-chamber of Erik XIV in Kalmar Castle gives an idea both about the decoration and the painting. The former is »intarsia», both for the ornamentation — which, like the whole room, is in the Renaissance style — and for the inlaid landscapes. The painting is represented by the large frieze above the wainscot, where you see a wild-boar hunt modeled in plaster and painted in natural colours. Also the old parts of Gripsholm Castle, where the ancient painting is retained; above all, in the bed-chamber of Duke Charles (»prison of Johan III») — give an idea about the taste of that period.

From the time of Gustavus Vasa inclusive, portraits of Swedish men and women begin to occur, but always, as far as is known, executed by foreign painters — Germans or Dutchmen. Gustavus is known to have been in communication with Master Jan van Scorel of the old Dutch school. Portraits exist of the King himself (1542) and of his sister Margareta (Gripsholm and Uppsala). But it was not till the 17th century that painters of distinction appeared in our country.

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One of them was *J. H. Elbfas*, who between 1625 and 1664 made rather good portraits of eminent men of the time, as Gyllenhielm, Skytte, Axel Oxenstierna. By Queen Kristina (1644/54) a couple of foreigners were called in, though they soon returned home, namely the Dutchman *Dav. Beck*, known for his portrait of the Queen, and the Frenchman *Sébastien Bourdon*, who also painted her. The most remarkable portrait of Kristina is, however, one by the Dutchman *Abr. Wuchters* (in Uppsala, 1667). Great harm was inflicted on art culture in our country by this queen's carrying away with her, after her renunciation of the Crown, those paintings by renowned artists — chiefly Italian, however — which, during the Thirty Years' War, had been brought home as booty from Southern Germany and Prague.

At the approach of the Caroline time in the latter part of the 17th century, a man made his appearance who was going to exercise a great influence on art in Sweden, namely the German, David Klöcker, later on ennobled into *Ehrenstrahl* (1629/98), who came already about 1650 but did not settle in earnest in our country till 1661. He was then nominated »court-counterfeiter» and, by and by, formed a school, which, during the end of the 17th and the beginning of the 18th century, became of signification for art, even though of a transitory one. On a foreign tour he got the opportunity of studying, first at Nuremberg, and then chiefly in Rome with Pietro da Cortona. Thus, his style was based on the principle of the Italian baroque — to follow in the steps of the great masters — whereby also a great deal of German heaviness forced its way into the unavoidable allegorical presentations. This shows plainly in his large decorative works, plafond and wall-paintings, e. g. the ceiling of the hall in the House of the Nobility — the »Consultation of the Virtues» (1674) — and in similar productions at Drottningholm palace. A couple of large but rather void religious pictures are: »The Crucifixion» and »The Last Judgment» in the church of »Storkyrkan» in Stockholm. During the whole of his activity, Ehrenstrahl shows a rather sharp eye for colours. But what he lacks more and more is the power of individualizing. And yet he had begun as an excellent portrait-painter, see the likeness of the great general and patriot Erik Dahlberg (1664, at Uppsala) and several portraits of Charles XI, alone or together with the royal family. That he also had an eye for nature is shown by his representations of horses, dogs, and other animals, as well as by the landscapes he put as a background to many of his pictures.

His foremost disciple was one of his relatives, *Dav. v. Krafft* (1655/1724), who became the »counterfeiter» of Charles XII and left many portraits of that King. from the first years of his reign till the last. Besides him, there were many portrayers during that period, as the Dutchman *Martin Meijtens*, who came into the country about 1670 and, amongst others, has painted the famous scientist Olof Rudbeck, Sen. (in Uppsala); likewise his relative *George Des Marées* (1697/1776), who was born in Stockholm but, after achieving many good portraits in Sweden, transferred his activity into Germany. Then may be added *J. P. Lemke* (1631/1711; summoned from Nuremberg), who at Drottningholm palace painted the battles of Charles X and Charles XI in Poland and in Skåne. As we have seen, all these artists were either immigrants or, at any rate, of foreign extraction. But at the rear of the long line we have to remember two Swedes: *Johan Sylvius* († 1695), who worked at the decoration of Drottningholm with plafond paintings, and *Erik Dahlberg* (1625/1703), the great engineer-general, who in his youth visited Italy, where he studied the art of drawing at the side of his portrayer, Klöcker, and who, later on, gave outline sketches, on the basis of which the battle-pieces of Lemke were carried out, and lastly, in his well-known collection of pictures of Swedish towns and estates, called »Suecia antiqua et hodierna», raised a memorial to himself of lasting value.

It was the disciples of D. v. Krafft, who during the first third of the 18th century supplied the demands of the time in the art of painting, i. e. as portrayers. There were first two older ones, *J. D. Swartz* (1678/1740) and *G.*

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Schröder (1684/1750), then *Lor. Pasch*, Sen. (1702/66), who at the beginning of the Era of Liberty was the portrait-painter in vogue, *O. Arenius* (1701/66), son of a clergyman in Uppland, succeeding Pasch about 1740, and finally *J. H. Scheffel* (1690/1781), who strikes a bridge, as it were, from the old manner of painting in dark colours to the fair tints of the rococo.

Thus, way was paved for French influence on Swedish painting, and this became an accomplished fact when the Frenchman *G. Taraval* (1701/50), on the impulse of Count K. G. Tessin, was called in, 1732, after which — in 1735 — the first foundation-stone was laid to the Academy of Painting by the mæcenas just mentioned. Taraval undertook to be the unselfish drawingmaster at the new institution, persevering in it till his death, and at the same time worked at the decoration of the royal palace. The first advocate for the French tendency was the Swede *G. Lundberg* (1695/1786). After living in Paris 1717/45 and learning the chief art of the rococo — pastel-painting — with the Italian paintress Rosalba Carriera, he came home during the last mentioned year and soon became the favourite painter of the upper ten thousand. Lundberg himself was also a man of the world, such as the time demanded, and most successful he was in ladies' portraits, among which the best certainly is an unfinished one of Mrs. Schröder, at the Academy of Arts. But had he been the first of the time to make a long stay in »the capital of taste» of that time, he was presently followed by a whole line of Swedish painters, among whom some went to find their artistical education in Paris, others again remained there as naturalized Frenchmen.

Foremost amongst these men *Alex. Roslin* (1718/93) may be deemed to stand; from his native town, Malmö, he came up to Stockholm in 1736 and studied under the care of Schröder, after which he went to Germany and Italy in 1745 — everywhere painting for his living. At last, he arrived in Paris, 1752, where, already in 1753, he became a member of the Academy. There he settled for the future. About 1775 he visited his native country and staid for some time in St. Petersburg. For the rest, he had his home in Paris, where he had married and where he died in the midst of the Revolution. During the days of his strength, he was the painter of the aristocracy and gratified these circles of society, who, may be, were less desirous of a deep characteristic than of brilliant colours and an illusory rendering of the dress material and ornaments, as for instance silk and velvet, gold and jewels. In Sweden, this art of his is represented by the large portrait of Gustavus III at Gripsholm as also by several good portrait-groups. One among his most graphic portraits is that of Karl von Linné (1775, the Academy of Science). — In Paris *P. Krafft*, Sen. (1720/93), also lived, who on his return home portrayed in the middle-class circles; there *Lor. Pasch*, Jun. (1733/1805), likewise lived, who after the Paris studies became the portrayer of the Gustavian era within the higher classes. — In Paris remained not only Roslin, but also the two renowned miniature painters *P. A. Hall* (1739/93) and *Nik. Lafrensen*, Jun. (1737/1807), the former of whom devoted himself exclusively to portraiture, while the latter at the side of this art paid homage to the frivolous tendency prevalent in French art at the time preceding the Revolution. Here may still be added two more of these Paris-goers, namely *P. Hillestrom* (1732/1815), a picturer of family scenes from the Gustavian era, and *A. U. Wertmüller* (1749/1812), who made portraits and mythological figures, partly in Paris, partly in Sweden, finally in America, where he died.

The last group of painters during the Gustavian era comprises those who had less to do with French art as a model but looked in other directions for their ideals, and partly numbered amongst the friends of Sergel. One of these independent painters, *K. G. Pilo* (1712/93), is not even altogether an adept of Swedish art of painting, because, though born a Swede, he spent his principal time of activity in Copenhagen, where he became the director of the Academy, and only

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at sixty years of age returned to Stockholm, where he became of great consequence to the development of the Academy. He then painted his chief picture, The Coronation of Gustavus III (the National museum), which, however, remained unfinished. *L. Desprez* (1737/1804) likewise occupies a place by himself; he was called in as a scene-painter for the new opera-house but also worked as a painter of pictures and as an architect. A soul most congenial to Sergel, in being an adherent of Neo-antiquity, was *J. A. Masreliez* (1747/1810), who already in his childhood had arrived in Sweden; a man more notable for his refinement, his ability as a teacher and promoter of industrial art, and for his art of drawing than for his pictures. To the same sphere also belonged *Elias Martin* (1739/1818), who mainly studied in London and became our first real landscape-painter, preceded only by the insignificant *J. Sevenbom* (1721/84), who has painted views of Stockholm. But Martin was moreover a figure-painter and a sensitive portrayer of rank, in whose works his English studies may be traced. The same is the case with the last portrayer in the era of Gustavus III, *K. F. v. Breda* (1759/1818), who after studying with Sir Joshua Reynolds in London, achieved excellent likenesses of the ladies and gentlemen of his time, whom he knew how to render with a good characteristic and fine colouring.

During the 18th century, the art of chalcography was also cultivated with a certain predilection, and the principal followers of it were: *P. G. Floding* (1731/91), who even organized an engravers' school, *J. Gillberg* (1724/93), and *J. F. Martin* (1755/1816) — brother of the painter — who besides portraits also made landscapes.

Had painting, like sculpture, had a period of golden days during the Gustavian era, the position of these two arts, during the first decades that followed 1809, became rather different. While sculpture, as we have seen, subsequently to Sergel kept to a relatively high standard, there occurred namely, soon after the decease of the surviving Gustavians, a retrograde in the art of painting, which now offers little of interest. The representatives of this untalented jog-trot were *F. Westin* (1782/1862), whose historical pieces were equally void and sleek as his portraits, and *P. Krafft*, Jun. (1777/1863), who in the beginning inspired great hopes, which, however, in course of time, by and by fell into dust. And, though denominated »a romanticist before romanticism», the landscape-painter *K. J. Fahlcrantz* (1774/1861) nevertheless was no artist of rank, even if it cannot be denied that he, at times, understood how to collect the impressions of Swedish natural scenery into a tone that created a wholecast picture. — The academic tendency soon met with opposition, not only by criticism, but also by artists longing for a more liberal and natural conception and mode of presentation. The first champion for this opposition was *K. G. Sandberg* (1782/1854) backed by Fogelberg, the sculptor. His sketches from the people's life, and the historical frescoes in Uppsala Cathedral were respectable attempts at a new style of presentation; his portraits certainly did not come up to Breda's but still they were truer than those by Westin.

These three — Westin, Fahlcrantz, and Sandberg — never went abroad, and the studies in Paris had now come to an end. It was Rome instead that the painters — like the sculptors before them — at present had in view. One among the first to find his way to Rome was *O. J. Södermark* (1790/1848), one of the many military men in Sweden who have acquired the name of an artist. He was a clever portrayer, who honestly and faithfully kept to nature. Still more accomplished within the same sphere was his protégé in Rome, *U. Troili* (1815/75), with whom this kind of painting again began to rise in Sweden. A third pilgrim for the same place was *N. J. Blommér* (1816/53), who via Paris arrived in Rome, where an early death awaited him when, in a foreign country, he had given shape to his imaginative dreams about the sagas and mythological figures of the North. *Egron Lundgren* (1815/75) visited not only Rome

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and Italy, but also Spain and India; he frequently took up his abode in England and has left us the remembrances of his travels in excellent water-colour pictures. *J. Stäck* (1812/68) and *G. V. Palm* (1810/91) — both landscape-painters — also went to Rome; the former has, moreover, painted views from Holland, the latter mostly from Italy. and Sweden. *J. Boklund* (1817/81) is chiefly meritorious as a teacher and as museum director.

Among other painters belonging to the middle of the 19th century may here be mentioned *P. G. Wickenberg* (1818/46) — the protégé of Sandberg — who in Paris astonished the world with landscapes of the North represented in the manner of the old Dutch painters. *Markus Larson* (1825/64), a volcanic, passionate nature, who by his impetuousness annihilated his great talent of representing cataracts in lugubrious surroundings and marine-pieces in a light full of effect; *Edvard Bergh* (1828/80), the lovely and faithful picturer of the birch-wood scenery in the Mälar valley; *J. Höckert* (1826/66), who returned to France, where he acquired a good reputation and, later on, was followed by many; an excellent colourist, and highly esteemed, more for his pictures from national life than for his historical paintings; *K. D'Uncker* (1828/66), who went to Düsseldorf for his education, to which town he then attracted many Swedes, and became a great master in character pictures with modern motives and many figures; and *F. Fagerlin* (born 1825), the last surviving painter of those marking the rise after the middle of the century, to which rise he effectually contributed by the talent he developed in Düsseldorf — where he has settled — of picturing Dutch low life in a spirited way. To the same group may be reckoned *G. Saloman* (1821/1902), a Danish artist educated in Copenhagen, then settling in Sweden and making genre pictures and portraits; and likewise the architect *F. V. Scholander* (1816/81), whose storied architectural water-colour pieces and fantastical illustrations to ancient sagas and to his own ballads are widely known. Finally, we will here also mention a lady, *Amalia Lindegren* (1814/91), who with success painted pictures out of common life and also portraits.

The painters remaining to be mentioned belong to the latter part of the 19th century, and most of them are still alive. They will here be divided into several groups, the first of which includes the artists from the sixties and seventies. The oldest of them is *M. E. Winge* (1825/96), who after academical studies and travels in the South, devoted himself to historical painting, with chiefly ancient Northern motives. Three of his principal works are to be seen in the National Museum: Kraka, Loke and Sigyn, and Tor's contest with the Giants. The same course was followed by his fellow-student, *J. A. Malmström* (1829/1901), who sent home from abroad Heimer and Aslög, The Sons of Ragnar Lodbrok, and Ingeborg receiving the message about Hjalmar's death. In Paris he began his great work, the Bråvalla battle, the first sketch for which he rejected to plan another, larger picture in 1869, which, however, he never accomplished. The former — still in existence — is his best production though. Moreover, he painted his highly esteemed »Elfvalek» (Fairy-dance), a series of images out of children's life, and illustrations to the poetical works, Frithiofs Saga and Fänrik Ståls Sägner. The two artists now mentioned reached the climax of that Old Scandinavian tendency made so much of by Charles XV. Then follow a couple of landscape-painters, viz., *Alfr. Wahlberg* (born 1834) and *G. Rydberg* (born 1835), the former rather cosmopolitan in his pictures from France and Italy, but also distinguished by those of his native country, e. g., from Hallands Väderö; the latter exclusively a picturer of Swedish scenery, with the blithe nature and aërial prospects of Skåne as his principal sphere. By way of transition, the architect *A. Th. Gellerstedt* (born 1836) — a disciple of Scholander — is put in here; he has accomplished several small landscapes in watercolours, whose dimensions and tone of familiarity equal his highly favoured small pieces of poetry. To these older painters also belongs

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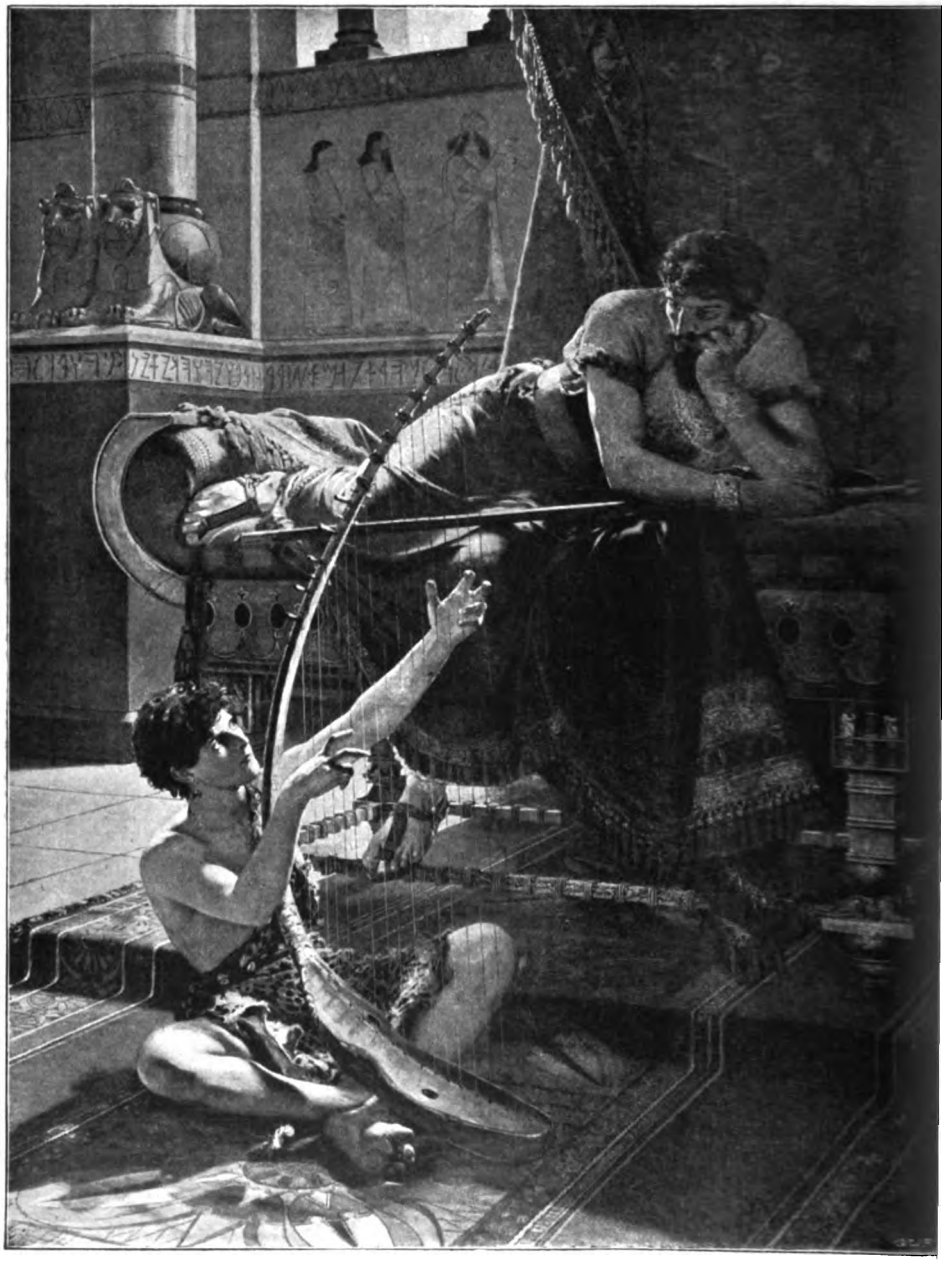

David and Saul. Picture by J. KRONBERG.

G. Brandelius (1833/84), who mostly studied in Paris and carried out very good genre-pieces from his native place, the province of Vestergötland — generally with a lively or comical motive out of the people's life, installed into well chosen natural surroundings, e. g., The Gate-boy.

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In the center of this group stands the most prominent Swedish painter of the period, count *G. v. Rosen* (born 1843), who, after studies at home but chiefly, though, under the direction of Ley, the Belgian, undertook several travels for study, two of which he directed to the Orient. As a history-painter, he has mostly kept to the 16th century, especially to Erik XIV and the people surrounding him: Karin Månsdotter and Göran Persson; also The Prodigal Son is depicted in the style of that age. Moreover, he is a portrayer of supreme rank (his Father, Nordenskiöld, Pontus Wikner, and the painter's own portrait for the Uffizi gallery in Florence). *H. Salmson* (1843/94) began as a history-painter but then passed over to pictures out of the people's life, with subjects mostly from France (Picardie), but also from Skåne. *G. Cederström* (born 1845) entered the military career but turned painter and has, in this capacity, in several pictures treated the time of Charles XII. But besides, he has also painted other subjects, amongst which The Salvation Army in Paris is considered to be a most successful grasp. His Magnus Stenbock in Malmö is not to be forgotten either. *J. Kronberg* (born 1850), like the two preceding ones an eminent painter of the time, has studied chiefly in Munich and Rome and displayed his activity within all the spheres of painting. His Dryad was the first work to spread his fame, and it was followed by several similar pictures of imagination; later on, he produced his famous »David and Saul». He has also accomplished two large decorative pieces of work, namely the plafond paintings in the western stairway of the Royal palace and the cupola of Adolf Fredrik's Church. Finally has *N. Forsberg* (born 1842) depicted an episode out of the French-German war, »A Hero's Death», and Gustavus Adolphus at Lützen, and *K. G. Hellqvist* (1851/90) has in pictures out of our old history stood up as a representative for contemporaneous German historical art. Specimens are: Valdemar Atterdag in Visby, and Olaus Petri and Peder Galle — both in the National Museum.

Like at many other places in Europe, the artists of our country were during the eighties and nineties divided in two separate groups, one of which comprises those following the traditional course, the other again those striving for the liberation of painting from authoritative bonds in conception and for bold experiments in execution. To the former tendency — also called the academical — we reckon many good artists, most of whom are landscape-painters. The oldest amongst them is *O. Arborelius* (born 1842), who has studied principally in Düsseldorf and Munich, and preferably pictures the scenery of his native province, Dalarne, and the mining districts with accessories of people and animals, e. g., Chalet pasture in Dalarne, and Mora Church in winter-time. Then comes *R. Norstedt* (born 1843), natural poet with French colouring, who, however, mostly paints Swedish scenery with motives from his native place, Vingåker; also his wife, *Anna Norstedt* (Miss *Munthe*, born 1854) is an excellent paintress of still life and flowers. Further, *A. Lindman* (born 1848), who has studied in France and Italy, produces sea-paintings; quite lately one representing the Norrström in Stockholm. Particularly eminent was the late marine-painter *K. Skånberg* (1850/83), the first who knew how, in an illusory way, to render water in motion, chiefly in Swedish and Dutch sea-ports but, above all, with motives from Venice. Here we must remember a couple of lady-portrayers: Miss *Hildegard Norberg* (born 1844), who studies in Paris and has distinguished herself for good and characteristic likenesses of elderly men, e. g., Rector Selggren, Professor Lindhagen a. o., and Mrs. *Hildegard Thorell* (Miss *Bergendal*, born 1850), who has studied in Paris and Copenhagen, and among whose first productions the portrait of a lady, now in the Gothenburg Museum, attracted attention. A thorough artist is *E. Rosenberg* (born 1858), who, choosing his motives from the Södermanland side of Stockholm, pictures the poetry of nature in the environs of that town; most mightily he has done so in the stately picture »March Evening», the result of a

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A Hero's Death. Picture by N. FORSBERG.

decennial work. *A. Jungstedt* (born 1859) has studied at home and abroad, and his first love within the world of art was the depicting of landscapes with quarries and sandpits and accessories thereto, but, later on, he embraced painting of portraits, amongst which two of King Oscar are to be noted — one in the »foyer» of the Royal Opera, the other one, a knee-piece in a military cloak and a general's cap, taken during a drill. Moreover, he has accomplished plafond paintings for the Church of St. Olof in Norrköping. Three landscape-painters here form one group: the oldest is *A. Fahlcrantz* (born 1851), a lover of moonlight and dusk and strange effects of light in the clouds, and who chiefly has taken his motives from the Baltic, outside of Stockholm; the second is *G. Kallstenius* (born 1861), who generally paints the nature of Central Sweden with its varying scenery of land and lake, mountain and wood, lately fond of producing strong effects of sunlight, e. g., in Forest lake in the Evening Sun (the National Museum); the third is *A. Schultzberg* (born 1862), who has studied in the South, but spent his talent on winter pictures from his native province, Dalarne, amongst which Walpurgis-night (the National Museum) with the fantastic light from the flickering bonfires is the most noteworthy. *A. Wallander* (born 1862) has in coloured chalks made characteristic pictures from national life, but is now modeling and decorating within the sphere of ceramic art. *W. Smith* (born 1867) has painted both landscapes and genre-pieces full of character; *G. Ankarcrona* (born 1869) has also with genuine Swedish power, especially in the aërial parts, accomplished landscapes with figures; and *A. Bergström* (born 1869) is a truly poetical painter of natural scenery, whether it be pictures from the French coast or familiar Swedish pasture-grounds and groves.

To the last group, which, properly spoken, made its appearance in 1885 and then termed itself »Opponents», but in 1891 exhibited its works conjointly with those of the group just mentioned at the International Exhibition of Munich, where both did honour to the Swedish name — belong several men of eminent talent,

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who will here be arranged according to their natal years, on much the same principle as the preceding ones. First we meet one among the foremost of the party, *Ernst Josephson* (born 1851), who after five years of extensive traveling for his development, began his independent activity in Stockholm and immediately made himself known to be a thoroughbred colourist, as he had promised already in his David and Saul (1878). It was figure-painting and portraiture to which he devoted himself; foremost stand Spanish pictures of several kinds, e. g., Spanish blacksmiths (1882, in Christiania), the River-god (1884), some genre-paintings, and the distinguished portraits of Skånberg and Österlind, the artists, as well as of Mr. Renholm, the writer. But before the close of the eighties, his activity was interrupted by illness. *Carl Larsson* (born 1853), who also belongs to the party, is one of the most personal among our painters, and that not only inasmuch as he generally paints himself and his family, but also because of his genuine Swedish temperament. The watercolour-series »A Home» (in the National Museum) is the most typical in this respect. For the rest, he is the frescopainter who made the pictures out of Swedish history of art in the staircase-porch of the National Museum. Besides, he has decorated one of the Girls' colleges in Gothenburg with wall-paintings as also the »foyer» of the new Royal Theater, and, of late, he has executed the large fresco for a State College in Stockholm, »Students during military divine service». *R. Thegerström* (born 1854), to begin with, painted genre-pieces and landscapes but then passed over to characteristic portraits of musicians depicted in their activity: Aulin with his violin, Stenhammar at the piano — urged to this change of subjects, not only by personal friendship, but also by love of their art. *C. Nordström* (born 1855), who, like his comrades, studied in Paris, paints powerful, somewhat harsh landscapes with motives from the west-coast, especially Halland (Varberg) and Bohuslän (Tjörn), but also from the neighbourhood of Stockholm. *G. Pauli* (born 1855), a versatile artist, has executed landscapes and genre-pictures, as Summer Evening, Child of the Lord's Supper, and Midsummer-wake, as also frescoes in the staircase-porch of the Gothenburg Museum and in the Southern State College in Stockholm, as well as decorations of the Royal Opera and the dining-hall at the Hotel Rydberg in the capital. His wife, *Hanna Pauli* (Miss *Hirsch*, born 1864), is a talented paintress, who has achieved genre-pieces, landscapes, and portraits. Many-sided is also *Eva Bonnier* (born 1857), who, besides landscapes and portraits, has carried out objects of industrial art in silver and bronze. *N. Kreuger* (born 1858), an original sketcher of scenery and animals, has studied in Paris but, in his motives, sticks to his native island — Öland — as also to Halland (Varberg), where he, together with Nordström and R. Bergh, constituted the »Varberg school»; he was staying there 1887/96. His speciality are panel oil-paintings and pencil-drawing. *R. Bergh* (born 1858) is a speculative artist who has worked within all spheres, even with his pen as an author. As a landscape-painter, he has, for instance, accomplished Evening tone (Varberg); as a genre-painter, Two Women at the hearth; as a portrayer, Miss Eva Bonnier, and the excellent portrait of himself for the Uffizi in Florence. But as yet, the most prominent place is due to his Summer Evening in the North, uniting figures with a glorious landscape. *O. Björck* (born 1860) studied in Paris and Munich, Venice and Rome and began as a genre-painter (e. g., Distress Gun, in Copenhagen, and The Vegetable Market of Venice, in Stockholm). Afterwards he embraced portrait-painting and was, to begin with, most successful with robust individuals out of the middle classes, but he has also noble figures of men and women, as Prince Eugen, V. v. Heidenstam, and his own wife. He has also painted a series of pictures decorating the dining-hall of the Opera Restaurant. *A. Zorn* (born 1860), the »enfant gâté» of Swedish art, has tried his powers in all spheres of art: portrait, genre, landscape; oil-painting, watercolour, etching; and sculpture. In landscapes, he excels in rendering water

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Anders Zorn.

in movement, in the genre he chooses his motives with preference from his native place, Mora in Dalarne, but does not by any means despise Spaniards or gipsies, or French women either. Midsummer-dance in Dalarne is one of his best works of the kind. As a portrayer, he has painted King Oscar, his own portrait, and many others — all in the same suggestive manner that in a suitable way causes colours and strokes of the pencil to flow together into an effect. He has just completed the modeling of a statue of Gustavus Vasa. *B. Liljefors* (born 1860) has become worldfamed as a picturer of animal life in the North. He first studied Uppland scenery in the neighbourhood of Uppsala, but has now settled in the »Skärgård» to study sea and water-fowl, swans, wildgeese, eiders, etc. His largest picture is that of Swans on the Wing, in a State College in Stockholm (Norra Latinläroverket). In the same college *Prince Eugen* (born 1865) has painted his hitherto greatest work: Skärgård landscape in the Twilight. He loves the scenery of poetical tone that our country has to offer and has produced many pictures of the kind, bearing the stamp of personal feeling, and with special attention he studies the atmospheric phenomena in various lights, at different times of the day.

Finally, the art of **etching** has of late successfully been carried on by several artists, among whom here may be mentioned *A. Hägg* (born 1835), *R. Haglund* (born 1844), and *A. Tallberg* (born 1860) — all of whom devote themselves to that art exclusively; and among other artists, chiefly *Zorn*, *C. Larsson*, and the architect *F. Boberg* (born 1860).

Music.

It is not, in fact, until in the 19th century that Sweden presents a really vital and independent art of music. But as far back as our history reaches, nay, even from the dim times of the Sagas, music and its practicians were much thought of by high and low. Songs were performed at sacrifices and festivities, the old *Scald* skilfully touched his harp in accompaniment to his song as well as with the intention of animating his audience to dance. Originally, singing was perhaps more of a recital and thus differed from the later national airs (Folkvisor) — the principal treasure of melodies in the middle ages — which used to be sung to the accompaniment of a pantomimic dance, as still is done in the Færöe Islands, and which is also indicated by the very name »ballad».

With the Roman Catholic Church the magnificent musical service of the same made its entrance with its singing priests and choristers. Vocal music became one of the chief subjects in the convent schools, and even after the Reformation it occupied a prominent place in the school time-table. The Vasa Kings were highly musical. Gustavus Vasa was an ardent lutanist, Erik XIV was a composer, Sigismund brought over Polish musicians to Sweden, Gustavus Adolphus

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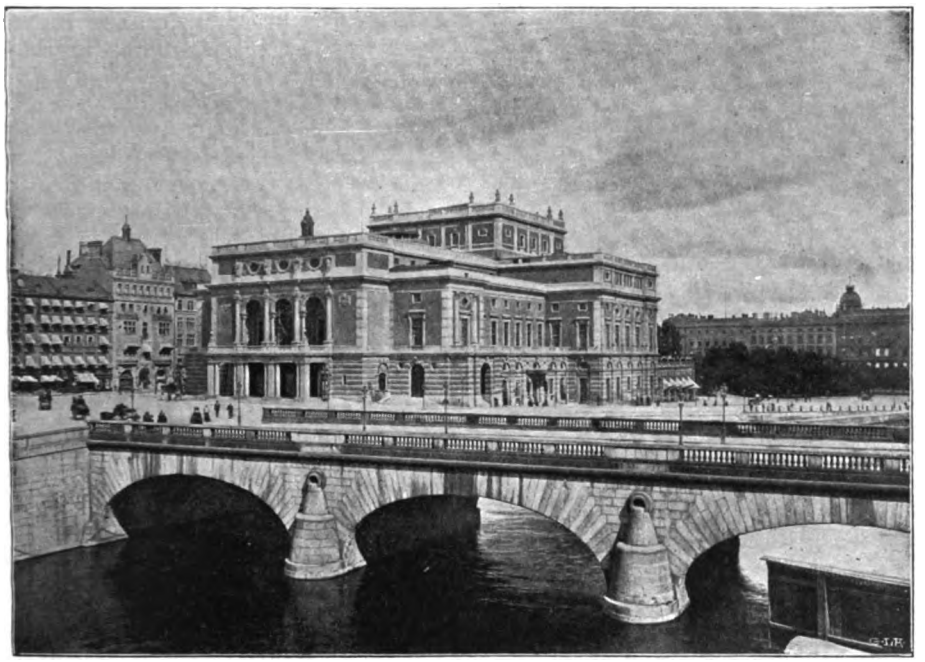
improved the regimental music, Kristina called in French and Italian singers and musicians and cultivated the allegorical »ballet» above all.

The *Düben* family was for a length of time the foremost representatives of Swedish music, somewhat later *J. H. Roman* (1694/1758). A more regular concert system now began to arise, and several foreign opera-companies were called in. A permanent Swedish stage was founded by Gustavus III and, in 1773, began its activity with the opera »Thetis and Pelée», then got a house of its own in 1782, inaugurating its work with »Cora and Alonzo» by Naumann, a German called in, which soon was succeeded by his »Gustavus Vasa» — for a long time considered to be the principal Swedish national opera (libretto by Gustavus III and Kellgren). Among other foreigners called in, *J. Hæffner* (1759/1833) is particularly to be noted as the specific creator of the Uppsala student-song and the systematizer of the chorals for the hymn-book by Wallin, of 1819.



The Royal Opera, Stockholm.

The 19th century was introduced with the annihilating plans of Gustavus Adolphus IV against the opera-institution, which, however, came to nothing but a temporary paralyzation. The matter of concerts was promoted by the instituting of the Harmonic Society in 1820, which, later on, was followed by a quantity of vocal societies in the capital and the provinces, especially for practising quartets of male voices — a creation of that century and an art in which Sweden ranks foremost. In this branch and — within the precincts of solo-singing — in the romanza, Swedish production has been more national than within any other branch of musical art. Amongst our quartet composers are to be mentioned foremost: *Otto Lindblad* (1809/64), the creator of the Lund student-song and the representative for the temperament of Southern Sweden, and *Gunnar Wennerberg* (1817/1901), moreover famous as a poet, who represents the North Swedish character and in his collection of duets, called »Gluntarne», has sketched student

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life in Uppsala, besides which he belongs to the few in our country who have tried their hands at oratorios.

An interest for the national ideas was chiefly roused by the »Gothic school» (see page 404) and particularly by means of the Swedish national airs (Folkvisor) published by *E. G. Geijer* (1783/1847) and *A. A. Afzelius* (1785/1871). The ditties sung at the end of the 18th century were either of a German character, as with *O. Åhlström* (1756/1835), or else of a French one, as in most of the Bellman airs (p. 401). A more Swedish stamp they assume, partly already with *J. E. Nordblom* (1788/1848), still more with Geijer, the great historian and poet, and further with *Adolf Lindblad* (1801/78), called »the Swedish Schubert». This tendency culminates in *A. Söderman* (1832/76), a type of Swedish temperament, much corresponding to what Grieg is concerning Norwegian disposition. Particularly in the department of the ballad, Söderman has, by the aid of the orchestra, achieved master-pieces such as Tannhäuser, The Ruin of the Mill, The Kevlaar Pilgrimage, The Black Knight, and Heartgrief. He also composed excellent musical contributions for dramas: The Ulfåsa Wedding, The Maid of Orleans, etc. and, in The First Achievements of the Devil, gave us our best operetta; but in spite of several plannings, he never could make up his mind to compose a great opera (just as little as Grieg ever did). — Famous and of great popularity is Söderman's composition for male chorus: The Peasant Wedding.

August Söderman.

Among the remaining romanza composers must be mentioned as the chief ones: *J. A. Josephson* (1818/80) and, of late, *E. Sjögren* (born 1853). Romanzas were also written by all the composers mentioned below a. o., and this our most national branch is flourishing still, even if it does not present the same skill in melody as it used to.

Within the operatic department vernacular production has been rather rich in minor operettas but poor in great operas of thorough merit. The musical drama, The Partisans of la Fronde by *A. Lindblad*, and the opera Estrella de Soria by *F. Berwald* (1796/1868), formed the programme at the inauguration of the new Operahouse, which was opened September 19, 1898. The style of these as well as of other earlier works attaches itself to Mozart, Weber, or Spohr, in the musical dramas also to that of the French Opéra comique. *I. Hallström* (1826/1901) made the influence of Meyerbeer and at the same time a somewhat livelier productiveness prevail, besides which he tried to introduce a national tone. »The Mountain-taken» (Den Bergtagna) is our first great national opera in the sense that both the subject, the libretto, and the national character are Swedish. A tendency towards nationality is also to be traced among his followers, at the same time as Meyerbeer is partly succeeded by Richard Wagner as a model. This is, for instance, evident in Harald the Viking and The treasure of King Valdemar (Valdemarsskatten) by *A. Hallén* (born 1846), in Tirfing and »Gillet (banquet) på Solhaug» by *W. Stenhammar* (born 1871), and in »Sveagaldrar» and »Ran» by *V. Peterson-Berger* (born 1867).

Instrumental music is in our country not particularly rich in composers; however, the number of them has been gradually increasing from Roman and *J. Agrell* (1701/67) up to our days. The names represented at the Swedish

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orchestra concert in Paris 1900 were, besides Berwald, Söderman, Hallén, and Stenhammar, only *L. Norman* (1831/85), *A. Rubenson* (1826/1901), and *H. Alfvén* (born 1872). But more might have had just pretensions of being remembered, for instance *F. Arlberg* (1830/96), *R. Henneberg* (born 1853), *A. Andersén* (born 1845), *J. A. Hägg* (born 1850), *T. Aulin* (born 1866), *Sjögren*, a. o.

Some of those already mentioned have also composed larger or smaller choral works, and besides them, *V. Svedbom* (born 1843), *E. Åkerberg* (born 1860), *I. Hedenblad* (born 1851), *A. Körling* (born 1842), and many others.

But it is not merely in the precincts of composition — especially that of romanzas — that Sweden holds an estimable place. In execution, it occupies a still higher or, at least, far better known position. Our singing has, on the whole, been one of the chief means to make Swedish music honoured abroad. Swedish student singers and Swedish female quartets have won laurels wherever they have appeared. Thus our students' performances were received with great applause in Paris at the Exhibitions of 1867, 1878, and 1900. Several among our lady-singers have become world-renowned. Many a one considers *Jenny Lind* (1820/87) the greatest singer that ever was. Admired more than anybody, perhaps — both in the Old and the New world — she offered the exceptional instance of one who, standing on the very height of success, leaves the stage to devote her skill to the sacred oratorio, and her life to family duties and charity. Mrs. *Louise Michaëli* (1830/75) and *Kristina Nilsson* (born 1843), at their periods of glory, were counted among the foremost. Of late years, *Sigrid Arnoldson* (born 1861), daughter to one of our principal tenors, *O. Arnoldson* (1830/81), has acquired European fame, as also *Ellen Gulbranson* (born 1863). Most of the pure and melodious singing voices, in which Sweden always was rich, have, however, preferred to choose for their sphere of activity our own lyric stage, which at present, in *Carolina Östberg* (born 1853) and *Valborg Svärdström* (born 1879), *C. F. Lundqvist* (born 1841), *A. Ödmann* (born 1850), and *J. Forsell* (born 1868), possesses excellent voices and, in *Mathilda Jungstedt* (born 1864), *Anna Hellström* (born 1875), *J. Elmblad* (born 1853; at present in New York), and *Sven Nyblom* (born 1868), artists of great dramatic skill besides.

Jenny Lind.

Dramatic Art.

The first definite vestiges of a vernacular dramatic art in Sweden may be traced back to the 16th and 17th centuries. Already before that, Moralities and Mysteries seem to have been acted here, and then — like the school dramas

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later on — by schoolboys and students, who also, at times, were allowed to appear at court. But the plays and ballets performed at the court festivals were generally carried out by foreign actors.

Our first professional actors were some students, who — having left the University of Uppsala — appeared on the stage of that town in 1682 and afterwards moved over to Stockholm, where they, in 1686, began to act before the public, from which year Swedish dramatic art thus may reckon its origin. These actors continued their activity till 1691 inclusive, and it then took more than forty years before a Swedish theatrical company again made its appearance. This new troupe was organized by *A. J. v. Höpken* and began its activity in 1737 under the name of the »Royal Swedish Stage» and with the French actor *Charles Langlois* for its scenic instructor. The best known among the staff of this Swedish stage are: *P. Lindahl*, *P. Stenborg* (1719/81), and Mrs. *E. Olin* (1740/1828).

However, Langlois did not succeed in keeping up the reputation of this stage for any length of time; it degenerated more and more and was finally, in 1753, replaced by a French company called in. Then it was *P. Stenborg* who, many years later, with unwearied energy tried to keep native dramatic art alive, and his exertions were crowned with success when Gustavus III started the Swedish theater anew, as the first instructor of which he engaged the Frenchman *Monvel*, father of M^lle^ Mars. Famous actors of that time were *A. de Broen* (1758/1804), *L. Deland* (1772/1823), *G. F. Åbergsson* (1775/1852), *Elisabet Fahlgren* (1771/1850), and *Maria Kristina Ruckman* (1769/1847). Among those who carried on their artistical studies at the school of Monvel was also our most renowned actor *L. H. Hjortsberg* (1772/1843), a master within all departments of his art, tragedy in its narrower sense excepted, and he still kept up his activity far into the 19th century.

Between 1840 and 1850, a more lively phase of development is entered upon by our dramatic art. To this result contributed largely the writer, Captain *A. Lindeberg* (1789/1849), who after several efforts managed to effect a revocation of a privilege for the Royal stage entitling it to the sole right of acting plays in the capital. In 1842, Lindeberg namely procured himself a license to build a new theater, the present Dramatic one, at which then a quantity of Swedish pieces were acted. More and more theaters have since been erected and at present there are in Stockholm no less than eight.

Among prominent actors from the golden days of last century may here be mentioned: *O. U. Torsslow* (1801/81), his wife *S. F. Torsslow* (1795/1859), *N. V. Almlöf* (1799/1875), his son *K. Almlöf* (1829/98), distinguished representative of comic characters, the wife of the latter, *B. Almlöf* (1831/82), the tragedian *G. Dahlqvist* (1807/73), the excellent comic *F. Deland* (1812/94), *Emilie Högqvist* (1812/46), *E. Swartz* (1826/98), above all famous for his Hamlet, *G. Kinmanson* (1822/87) and *K. G. Sundberg* (1817/98), both renowned as primo amorosos, *G. Fredrikson* (born 1832), who above all excelled in French comedy, the representative of romantic heroes *A. V. J. Elmlund* (1838/1901), the good-natured humourist *V. Holmqvist* (1842/95), and finally, the splendid tragedienne and character-actress *Elise Hwasser* (1831/94). The time during which all these in their full energy performed their artistical work, has on good reasons been termed the golden age of the Swedish theater, and they have left behind a vacuum not easily to be filled.

Among the phenomena of quite recent date within our dramatic art there is one especially apt to attract attention and which may be of far reaching consequences for that art. It is the fact of the Dramatic theater's having, from 1898 inclusive, lost its position of a royal stage and now being managed as a private undertaking by an association of actors without any public support except an abatement of house-rent. Simultaneously, the Opera has, under the name of »The

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Royal Theater», been delivered over to a company, that against the benefit of a State subvention has undertaken to maintain the artistical traditions of the former royal theaters. As aforesaid, there are also a number of private permanent theaters, the principal of which (five in Stockholm and one in Gothenburg) are directed by *A. Ranft* (born 1858), who has made praiseworthy and successful exertions of holding dramatic art on a high standard.

Among our present actors ought to be mentioned: *I. A. Lindberg* (born 1846), *E. Hillberg* (born 1852), *T. Svennberg* (born 1858), *O. Eliasson* (born 1863), Mrs. *J. Håkansson* (born 1853), Mrs. *L. Fahlman* (born 1856), Mrs. *L. Sandell* (born 1861), Miss *G. Lundequist* (born 1871) as representatives for tragic characters or higher dramatic tasks. Prominent in the comic branch are *G. Bergström* (born 1837), *N. Personne* (born 1850), *J. Riego* (born 1852), *O. Bæckström* (born 1854), and Miss *T. Åhlander* (born 1855). As primo amorosos *B. A. Palme* (born 1856) and *A. de Wahl* (born 1869) are distinguished representatives. Of late, *E. Fastbom* (born 1871; also successful author of popular works for the stage), Mrs. *H. Bosse* (born 1878) and Miss *A. Torsell* (born 1879) have attracted attention.

Concerning **lyrical dramatic art,** the reader will have to refer to the above article about Music.

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10. SCIENCE.

The summary review here presented of the historical development in our country of the particular branches of Science, cannot naturally pretend to be in any way exhaustive, but has as its object only to hold forth the more distinguishing features of it. Particularly as regards investigators and scientific men still in activity, the significance of their work can only imperfectly be presented, inasmuch as a full insight into this necessarily is a matter of the future. — As to the order in which the different branches are taken up, the old division into faculties, in vogue at our universities, is the one most nearly followed.

Theology.

The interest in culture aroused in Sweden during the Middle Ages was, as elsewhere, bound up with the Church and the Cloisters, and sought its nourishment more particularly at foreign Universities and in foreign literature, wherein mysticism preponderated. Only in the circle where stands *St. Bridget* († 1373) as the central personality, an independent production becomes apparent. No Swedish writer of the Middle Ages has displayed greater literary activity than Bridget herself. The importance of her writings does not lie in new religious ideas or their theoretical development, but in highly imaginative mysticism and practical religious force.

The theological work of the Reformation period is especially represented by the brothers *Olaus Petri* (1493/1552) and *Laurentius Petri* (1499/1573) and is essentially of practically ecclesiastical import. A remarkable work is the translations into Swedish of the Bible (New Testament 1526; whole Bible 1541), which takes a prominent place among the translations of the time, and has had considerable influence on the Swedish language and general culture.

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During the Orthodox Period (17th century) the Lutheran theology of Germany was, on the whole, closely followed. From the beginning of the century the following famous bishops *J. Rudbeckius* (1581/1646) and *L. Paulinus Gothus* (1565/1646) may be named as representatives of the Swedish theology of the period. — The lively scientific work of the 18th century had less to do with theology, although several of the foremost ecclesiastics are amongst the promoters of culture, e. g., the bishops *E. Benzelius*, the younger (1675/1743), and *A. Rydelius* (1671/1738). The latter carried on a particularly keen polemical activity against freethinkers and religious fanatics. This period produced the Svedenborgianism, which arose in Sweden, and has its chief documents in *E. Svedenborg's* (1688/1772) Arcana Cœlestia and numerous other writings; for some details of which, see p. 271.

In the beginning of the past century, newly-aroused religious interest reacted favourably on theology; more especially so the tendency, which came from the prominent Swedish clergyman *H. Schartau* (1757/1825), exercised a great influence, particularly in Southern Sweden. Most theologians followed closely the orthodox lutheran schools in Germany. Clerical education was raised by famous teachers, such as *S. Ödmann* (1750/1829) and *J. H. Thomander* (1798/1865). Among writers the following must be mentioned: *H. M. Melin* (1805/77) and *O. F. Myrberg* (1824/99), who worked more exclusively on Biblical exegesis. In opposition to the dominant orthodox views came *V. Rydberg* (1828/95) and *F. Fehr* (1849/95), the latter representing the school of Ritschl. *P. Wikner* (1837/88) was a religious philosopher in the Christian sense of the term.

Among theologians of the present day who have in a marked degree contributed towards promoting the study of theology, the following may be particularly mentioned: the Bishops *G. Billing* (born 1841), and *M. Johansson* (born 1837), Archbishop *J. A. Ekman* (born 1845), Professors *V. Rudin* (born 1833), and *P. Eklund* (born 1846). As exegetists mention must be made of Prof. *E. Stave* (born 1857) and *S. A. Fries*, D. D. (born 1867). In the domain of the history of religion Professor *N. Söderblom* (born 1866) has made himself known — *P. Waldenström* (born 1838), the founder of a free religious sect called after him, has also shown himself to be an industrious writer. — No unimportant part of the literary output of Swedish theologians is to be found in theological magazines, the most noticeable of which at the present time are »The Ecclesiastic Periodical» (Kyrklig Tidskrift) and »The Bible Student» (Bibelforskaren).

Under theology **Ecclesiastical History** is generally reckoned. Of Universal Church History there are, on the whole, only compendiums and monographs. Nevertheless, the »History of the Church of Christ» by *C. A. Cornelius* (1828/93) is worthy of mention. But special researches into the history of the Swedish Church have been undertaken, and the literature of monographs is particularly rich. Of wider interest is the »History of Svedenborgianism in Sweden» by *U. R. F. Sundelin* (1847/96). The chief works during the 19th century were written by *H. Reuterdahl* (1795/1870; the Middle Ages) and by *L. A. Anjou* (1803/84) and *T. Norlin* (1833/70), 16th and 17th centuries. At the present time this study is carried on with more and more ardour under the direction of Professors *H. Lundström* (born 1858) at Uppsala, and *O. Ahnfelt* (born 1854) at Lund. An organ for ecclesiastical history is »Annual of Church History» (Kyrkohistorisk Årsskrift).

Law.

In all the Swedish literature handed down to us from the Middle Ages the Ancient Laws, most of which are peculiar to certain provinces, undoubtedly occupy the most prominent place. These law-books have to a large extent, more

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or less directly, been the outcome of the provincial judges' decisions at assizes, formulated in the short, pithy doctrines, in which a primitive and sound sense of justice had taken form, and, moreover, possess both in matter and form a popular stamp in the best sense of the word. Learned studies in the domain of Jurisprudence were, nevertheless, by no means uncommon. We have evidence to show that a considerable number of Swedes, by taking the degree of L. L. D. at certain foreign universities, prepared themselves for the practice of their profession in their own country, and as soon as the University of Uppsala had been founded (1477) provisions were made for establishing courses of Law lectures there. Swedish medieval literature can also boast a work on jurisprudence of high rank, viz., the book on the Government of Kings and Chiefs (Om konunga- och höfdingastyrelse), composed about 1350 by an unknown scholar.

The century of the Reformation was, for many reasons, unfavourable to the development of Swedish jurisprudence — a branch of science which, on the other hand, in different directions, attained a somewhat noticeable degree of culture in the 17th century. The study of medieval law was pursued with ardour; the work of legislation was able to show very promising strides in the sphere of Common Law, and splendid results in special legislation, especially with regard to Maritime Law. The new problems and interests which devolved on Sweden as a consequence of her successful imperial policy, brought about a widening also in her judicial outlook at the same time as the altered position of the nation facilitated the invitation of several distinguished foreigners. Besides the Hollander *Hugo Grotius* (1583/1645), who was, however, only in the diplomatic employ of Sweden, the German *S. v. Pufendorf* (1632/94), is the most renowned jurist of the period. The latter became professor at the newly-established University of Lund (1668), and there composed the great work on the Law of Nature and International Law, on which his fame is chiefly based. Already earlier (1655) International Law had a representative of its own, perhaps the first in Europe, at the University of Uppsala. Of greater and more lasting importance, however, for Sweden was the activity displayed in Swedish home legislation in its various phases of development. Among the numerous persons who contributed important services in this branch, *J. Loccenius* (1598/1677) deserves to be first mentioned, for he not only gave to Swedish law literature, during a career of fifty years' activity, its first systematic works, but also successfully devoted himself to the interpretation of the ancient laws of the country. As an historical jurist he is, however, surpassed by *J. Stiernhöök* (1596/1675), the most prominent scholar of the 17th century in Sweden, whose epoch-making book on the ancient laws of the Swedes and Goths may to this very day be regarded as unique of its kind.

Thanks to these researches in Old Swedish law, the people of Sweden could protect themselves against that invasion of foreign principles of jurisprudence which, in consequence of close political and literary connections with foreign nations, once threatened to take place. The great work of legislation, which was prepared and begun in the 17th century, finally, under the masterly direction of Count *G. Cronhielm* (1664/1737) resulted in a common lawbook for the rural districts and the towns (1734), based on purely Swedish legislative principles. This lawbook for half a century having called for the best juristic abilities, also in its matter, style, and language became a masterpiece, the value of which for future ages can hardly be overrated.

It was only natural that theoretical jurisprudence should proceed on the national lines laid down by the new lawbook. To penetrate ever more into the spirit of this code, and to investigate still more carefully ancient Swedish law were the distinguishing features of the efforts made by the jurists of the 18th century, especially by the most famous of them all *D. Nehrman*, ennobled Ehrenstråle (1695/1769), and *M. Calonius* (1737/1817).

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During the 19th century the study of Historical Jurisprudence has, in an especially high degree, been assisted by the excellent publication of medieval Swedish Laws — the result of *K. J. Schlyter's* (1795/1888) extraordinary industry and acumen. Next after this gigantic work may be mentioned the comprehensive law projects which for the most part, under the actual direction of *J. G. Richert* (1784/1864), were prepared by the Law Committee and the earlier Law Commission. These projects, which, even if important doctrines have been introduced from abroad, are, nevertheless, in a marked degree, inspired by the spirit of Swedish jurisprudence, and can even in respect to their form be compared with the Code of 1734.

In theoretical jurisprudence a close investigation into historical jurisprudence, an extensive comparison with foreign law, and a careful grounding in the principles of legislation have co-operated to progress in learning. Among writers in this respect stand first and foremost *J. Holmbergsson* (1764/1842), *F. G. G. Schrevelius* (1799/1865), *P. E. Bergfalk* (1798/1890), *S. R. D. K. Olivecrona* (born 1817), and *E. V. Nordling* (1832/98). It will not be possible to assign the Swedish jurisprudence of the present day, or even the greater part of it, to any particular school, either native or foreign. Undoubtedly, however, the idealistic philosophy, introduced or further developed by many Swedish scholars, and especially by *Boström*, has exercised a great influence even on jurisprudence during the last few decades.

Philosophy.

It was with the transplantation, in the 17th century, of Cartesianism into Swedish soil that philosophical science came to be, for the first time, an effective agent in the cultural life of Sweden. This new tendency met with a violent opposition from the zealous theological orthodoxy, armed with scholastic Aristotelianism; but it finally carried the day. The champion of Cartesianism during the days of combat was *J. Bilberg* (1646/1717). The controversy found expression in academical dissertations, or in theses and disputations founded on them. Nearly all discussions of philosophical problems during the 17th and 18th centuries assumed that form. Comprehensive and independent investigations were scarce. The most prominent Swedish philosopher during this period was *A. Rydelius* (1671/1738), who made it his chief effort to mediate between theological orthodoxy and Cartesianism. Later, the philosophy of Leibniz-Wolff had a noteworthy exponent in *N. Wallerius* (1706/64).

The next evolutionary period coincides with the Gustavian era, when some of the literary leaders, mainly actuated by French and English influence, expounded the philosophy of enlightenment of that day. Among them may be mentioned *J. H. Kellgren* (1751/95), *K. G. af Leopold* (1756/1829), *T. Thorild* (1759/1808), and *K. A. Ehrensvärd* (1745/1800). With *D. Boëthius* (1751/1810), a thinker of a more genuinely scientific cast, the Kantian philosophy was introduced, under violent opposition from the champions of »common sense», in Sweden. And Kantianism, in its turn, opened the door to the great idealistic system of Fichte, Schelling, and Hegel. This speculative system was, in Sweden, represented especially by the keen and gifted *B. Höijer* (1767/1812), whose most famous work, »Den filosofiska konstruktionen», is translated into German. Höijer has experienced and, with a certain independence, worked over all the idealistic evolution in thought of his day, originating with Kant, and has reproduced it in a form most nearly akin to that of Fichteanism. In the poet *P. D. A. Atterbom* (1790/1855), the Romanticism of Schelling is mirrored, although the philosophical thought is not clearly expressed. More recently, *J. J. Borelius* (born 1823, late professor at Lund) has devoted a long life as author and academic teacher to the task of engrafting on the philosophy of his country the results of the speculation of Hegel.

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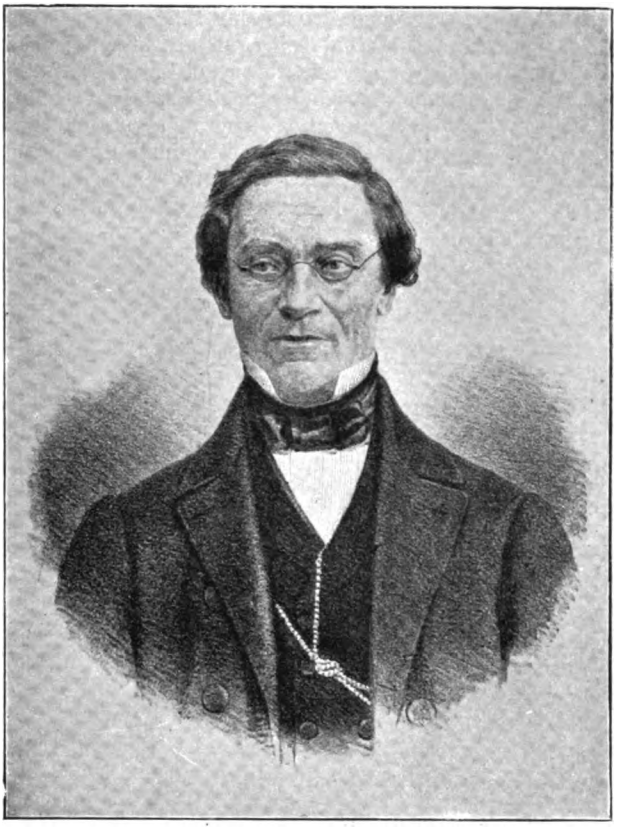

Kristofer Jakob Boström.

But the philosophical spirit in Sweden has not only been sensitive to the general evolution of philosophy, and retained a certain independence in adopting the results of that evolution; it has also produced a real **national philosophy**, reflecting in thought the innermost essence and character of Swedish culture. The characteristic features of that culture tend together to the freedom and unbounded development of the individual, while, at the same time, a well regulated social order and a pure and living religiousness is preserved. Thus the Swedish people combines in its ideal of culture law with liberty, and faith with knowledge. It is to this tendency that the *Swedish personal philosophy* gives a rational expression. It has its chief source in the loving reverence for human freedom and self-determination, for right and duty, and for man's calling to eternal life in truth and righteousness. The national Swedish philosophy is usually called by the name of its real originator, the most independent and original systematizer of Sweden, *Kristofer Jakob Boström* (born 1797, professor at Uppsala, dead 1866; his Works, edited by H. Edfeldt, are complemented by his Lectures on Philosophy of Religion and on Ethics, edited by S. Ribbing). The philosophy of Boström can be understood and judged only in connection with the evolution of philosophical science abroad and in Sweden. It probably had its origin, externally, in the ideal sphere of Schelling, while, looked at from an internal point of wiew and according to its actual bearings, it was prepared by that philosophical tendency in Sweden whose promotors were the Uppsala professors *N. F. Biberg* (1776/1827), *S. Grubbe* (1786/1853), and *E. G. Geijer* (1783/1847). The last mentioned, also and above all the foremost historian of Sweden, takes in philosophy a special position pretty distinct from that of the professional philosophers. His chief philosophical work (Lectures on the History of Man, noted down and edited by S. Ribbing) expounds the philosophy of history on the foundation of a deep, metaphysical speculation, where the personal idea is the center.

The philosophy of Boström is expressed in a system which is clear, simple, and grand in its fundamental conception, original in its invention, and consistent, though rather brief, in its execution. Its fundamental theoretical part breaks with the constructional method of the pantheistic idealism of Germany, and un-

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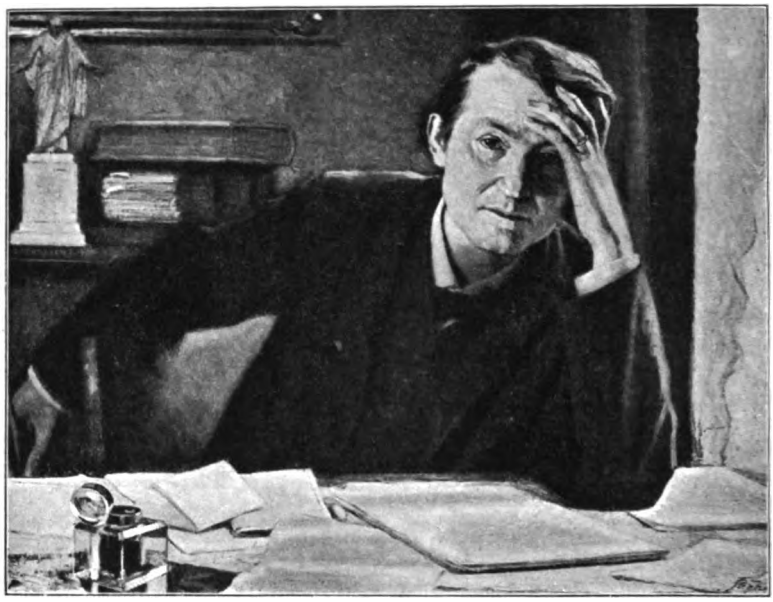
like it, seeks the foundation of our time and space-bounded world in a spiritual, unchangeable, and eternal being, an absolute personality above and independent of it. The sociology and state theory of Boström, as well as his ethics and philosophy of religion, i. e. his whole practical philosophy, are rarely rivaled in the reasonable purity of their pervading tone, and in an uncompromising adherence to the fundamental thought of personal self-determination. The philosophical view of Boström has had a powerful influence upon the higher spiritual life of Sweden, and continued for a long time to reign wellnigh absolute within his own science.



Pontus Wikner.
After a painting by G. von Rosen.

Owing to various conditions, the national Swedish philosophy has not yet reached results adequate to the significance of its indwelling thoughts. Such deep preparatory investigations as must form the basis of a philosophical structure, now more than formerly, have by Swedish thinkers been published only to a limited extent. To this may be owing also the fact that Swedish philosophy has not been able to hold its own so successfully against naturalistic tendencies as might be expected from its scientific resources. Yet, it continues, within the so-called Boströmian school, its aims and development. Among the older representatives of this school who have worked in close contact with the original form of the Boström system, may be mentioned especially the Uppsala names *S. Ribbing* (1816/99), *C. Y. Sahlin* (born 1824, late professor at Uppsala), *K. Claëson* (1827/59), and *H. Edfeldt* (born 1836), and the professors of Lund *A. Nyblæus* (1821/99), and *P. J. H. Leander* (born 1831). Among members of a younger and less homogeneous group, but continuing historically the Boströmian philosophy, though nevertheless in part deviating from it, are counted the Uppsala Professors *E. O. Burman* (born 1845), and *K. R. Geijer* (born 1849), the Uppsala Docents *L. H. Åberg* (1851/95) and *F. v. Schéele* (born 1853), and at the Private University of Gothenburg Professor *V. Norström* (born 1856), and Docent *E. Liljeqvist* (born 1865).

Among all, *Ribbing* by his learned and original work »Platos Ideelära» (also in a German translation) and »Socratische Studien», which must still be consulted

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by foreign philosophy, has revealed the close mental kinship of national Swedish philosophy with Greek idealism. In a grandly conceived, though unfortunately uncompleted work of elegant and fluent diction, »Den filosofiska forskningen i Sverige» (The Philosophy of Sweden), *Nyblæus* has traced the development of Swedish philosophy from the close of the 18th century to Boström inclusive. *Sahlin*, the notable reformer and developer of the Boström philosophy has with great penetration treated its various parts, and thus given it additional strength and clearness, and in many instances also greater pregnancy.

P. Wikner (1837/88), an immediate disciple of Boström, stands apart from the above groups, and has followed the special paths of his sensitive and religious mind. Already by his work »Egenskapen och närgränsande tankeföremål» (The Properties) he deviated materially from his master, and the breach was widened by later productions.

V. Rydberg (1828/95), as shown by the all-pervading spirit of his manysided literary activity and especially by the ideal and personal manner employed in his philosophical writings, came near to the Boströmian tendency. More than anybody else he has promoted the spreading within wide circles of the essential life of Swedish idealism.

Finally, it may be mentioned that, apart from those referred to already, *H. Larsson* (born 1862), professor at Lund, *A. Herrlin* (born 1870), docent at Lund, and *A. Vannérus* (born 1862), scholar and author in Stockholm, are working in the field of philosophical science.

Philology.

The first really scientific efforts at independent production in respect to philology were made under the ægis of archeology. As the father of it we are wont to reckon *J. Bureus* (1568/1652), who was impelled, by his interest in antiquities and his bent towards the mystical, to busy himself with the runes. Bureus also devoted himself to cabalistic studies, was a prominent scholar of Old Swedish language and literature, and, at the same time, our first more scientific folk-lore investigator. Among his successors are to be noted *G. Stiernhielm* (1598/1672) and *J. Schefferus* (1621/79), the latter more especially celebrated as a classic philologist. A new impulse was given to the study of our native tongue in the latter part of the 17th century, when a considerable number of Icelandic manuscripts were collected by order of the State. This material was elaborated especially by *O. Verelius* (1618/82), who, among other things, wrote an Icelandic Dictionary, *J. Peringskiöld* (1654/1720), and *J. Hadorph* (1630/93). The two last-mentioned likewise certainly deserve great credit as regards runic research through the magnificent pictorial work, »Bautil, all the Rune stones of Svecia and Gothia», which was mainly executed by them (especially Hadorph), though not published until 1750. Another prominent runologist was *M. Celsius* (1621/79). The purification of the Swedish language was a subject that in a great degree occupied the attention of the learned during this period, and their zeal found expression in the publication of grammars and treatises on orthography, e. g., by *N. Tiällmann* (1652/1718), and *J. Svedberg* (1653/1735). Of an original character, and with views on the question of grammatical correctness which partly coincide with those now in vogue, is the sketch of a grammar bearing the title of »The Culture of Swedish», of which *S. Columbus* (1642/79) was the author. — During this and the following period much was accomplished by collecting, in the course of travels abroad, valuable Oriental manuscripts (especially Arabic). Notable collectors within this branch were *G. Peringer Lillieblad* (1651/1710), *G. Sparfvenfeldt* (1655/1727), known also as a distinguished Sclavonic scholar, *J. Palmroot* (1659/1727), and *M. Eneman* (1676/1714).

With *J. Ihre* (1707/80) philology enters upon a new period, characterized by pointed criticism and widened views. Ihre is perhaps the greatest genius in

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Swedish philology. He led the work of research on to a broader foundation by consulting Gothic as well as other ancient Teutonic languages in his study of the Scandinavian ones. The best known of his numerous works is »Glossarium Sviogothicum», which still holds a prominent place among etymological glossaries. Also our native dialects received his attention. Foremost among dialectologists is to be mentioned *S. Hof* (1703/86), who, among other things, wrote an excellent work on the West-Gothia dialect. A diligent and influential grammarian and lexicographer is found in *A. Sahlstedt* (1716/76). Among Runologists *O. Celsius* (1670/1756) stands forth as a worthy contemporary of Ihre and Hof as regards sound scientific criticism and keen observation. To the following period belongs partly the runologist *J. G. Liljegren* (1789/1837).

Able orientalists were *C. Aurivillius* (1717/86), the above-mentioned *O. Celsius*, *J. J. Björnståhl* (1731/79), *M. Norberg* (1747/1826), *A. F. Sturtzenbecker* (1757/84), *K. M. Agrell* (1764/1840), *J. Berggren* (1790/1868), and *J. D. Åkerblad* (1763/1819), a man of genius, who, from his important contribution to the interpretation of the Rosetta stone, has been called »the first egyptologist».

In the middle of the 19th century, the historical and comparative study of languages — the science of Rask, Grimm, and Bopp — pushes its way into Swedish philology. Excellent material had, even before this, been provided in the splendid edition, by *K. J. Schlyter* (1795/1888), of the old laws of Sweden, containing most excellent glossaries and vocabulary, as also in the publications of the early Swedish Text Society, instituted in 1843, in which publications *G. E. Klemming* (1823/93) displayed special activity. The one who introduced the method of historical research into Sweden was *J. E. Rydqvist* (1800/77) by his great work »The Laws of the Swedish Language», which is »the first and largest, strictly scientific work on the history of our native tongue». *J. E. Rietz* (1815/68) published an extensive Glossary of Swedish Dialects. *C. Säve* (1812/76) was the first professor of Northern languages at the University of Uppsala.

The advance philology has made in our country during the last generation is very considerable. As a characteristic of the researches during this period, it is noticeable that the biological point of view — the study of the *living* language — has begun to receive more due attention. Phonetics, which previously had a prominent advocate in the zoologist *K. J. Sundevall* (1801/75), broke through, and made a stir in orthography and pedagogics, thanks especially to the energetic work, partly of the zoologist *I. A. Lyttkens* (born 1844) and the romanologist *F. A. Wulff* (born 1845) — an extensive work on Swedish phonetics and a Swedish Pronouncing Dictionary, are a result of their joint labour — partly also of Professor *J. A. Lundell* (born 1851). The latter, editor of a journal on Swedish dialects and peasant life, was also one of the leaders of that movement, during the seventies and eighties, which gave new life to the study of country dialects and peasant life, and which, directly or indirectly, became the cause of a great number of good works in this direction. This movement — which was kept up by a certain ideal, rurally national enthusiasm, the country people being looked upon as the very core of the nation, their dialectic tongue as a purer and more regular development of Old Swedish than the speech of the cultured — abated towards the end of the eighties. To make up for this, and on the initiative of the Saxonist, Professor *A. Erdmann* (born 1843), one has, of late, proceeded to organize Committees to arrange about systematic and paid investigations into country dialects.

The founding, by students, of a journal on country dialects is an outcome significant of the democratic and natural scientific direction of the seventies and eighties. On the other hand, the inclination towards the psychological and esthetical, which, in philology, are distinguishing features of the very latest times, and have tended towards getting the main consideration of import removed from phonetics and morphology to sematology, syntax, and style — from the more natural dialectic

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tongue to the more »affected» language of the cultured and have received an expression in the appearance of an organ devoted to the new Swedish language of literature: the periodical entitled »Språk och stil» (Speech and Style), edited by some students at Uppsala.

In the University city of Southern Sweden, a number of older and younger minds had, even earlier, become attracted to the study of the King's Swedish, from the time that the Swedish Academy, at the suggestion of *T. Wisén* (1835/92), decided to take up in earnest the plan of working out a *Swedish Dictionary* on a large scale answering to the claims of the time. In 1893, the first part was published. At that time *K. F. Söderwall* (born 1842), author of a model »Dictionary of Medieval Swedish», became Chairman of the Editorial Board.

The investigation in Scandinavian philology is at present very well represented. Professor *L. F. Läffler* (born 1847) has fundamentally contributed to the comprehension of the phonology and history of the Teutonic and Norse languages. The authorship of Professor *A. Noreen* (born 1854) has been particularly fertile and significant. Through his earliest works he made an era in the history of dialectical research. Later, he has published excellent works on Old West-Scandinavian and Old Swedish grammar, and general philology. At present he is publishing a very extensive work on the Swedish language (»Vårt Språk»).

Axel Kock.

Very important investigations, especially in the history of Swedish, have been made by Professor *A. Kock* (born 1851), editor of »Archives of Scandinavian Philology», the leading periodical in its line. Through his numerous works Kock has, perhaps more than anyone else, enriched our knowledge of the early development of the Swedish language. Professor *E. Tegnér*, Jun. (born 1843), has published some exceedingly clever works on the philosophy of language and modern Swedish philology, such as »The Power of Language over Thought» and »On Swedish Gender». Valuable studies have been made on word formation, and on loan words, especially on the influence of Low German on Swedish, by Professor *F. A. Tamm* (born 1847), of whose principal work, a Swedish Etymological Dictionary, the first parts are issued. Professor *J. G. Ch. Cederschiöld* (born 1849) has made himself known as an editor of Old Icelandic texts, and through his interesting work »On Swedish as a written language», *E. Hellquist* (born 1864) by studies on etymology, and the Swedish of the 17th century, and *O. v. Friesen* (born 1870) by treatises on prehistoric Old Northern.

In regard to the study of runes Professor *S. M. Söderberg* (1849/1901) and Dr. *E. Brate* (born 1857) have been industrious. Preparations have long been made for an extensive standard work on the Runic Inscriptions of Sweden. The first part of this undertaking, published under the auspices of the Academy of Literature, History, and Antiquities, has lately appeared, edited by Söderberg.

The Swedish students of Teutonic languages have quite naturally been led to devote their main attention to the Scandinavian languages. Specific German and

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English philology have not in any marked degree been furthered by Swedish scholars, although the Swedish custom of »speciminating» for the vocation of a teacher, has called forth quite a number of treatises on the subject. Of the more noted among authors in this branch of philology may be mentioned Professors *A. Erdmann* (born 1843; »Über die Heimat und den Namen der Angeln»), *A. E. Wadstein* (born 1861; »Kleinere altsächsische Sprachdenkmäler»), and *E. Björkman* (born 1872; Scandinavian Loan-Words in Middle English).

Gothic has had especial reason to be cherished in Sweden from the circumstance that in our country the most important monument of this language is preserved — the so-called Codex argenteus in Uppsala. Verelius, and after him Ihre, were already busy with this work, but not till an excellent edition of it got published by *A. Uppström* (1806/65), was it presented in a form to satisfy the requirements of research. — Indo-Germanic comparative philology has nowadays a number of successful students in Sweden, as Professor *E. Tegnér*, Jun. (»The palatals of the Arian languages»); *O. A. Danielsson* (born 1852), who has more especially treated the Greek and Italian languages, and at present is occupied with the edition of a *Corpus inscriptionum etruscarum; K. F. Johansson* (born 1860), who has been active in a great many branches of his science; *P. Persson* (born 1857; »Studien zur Lehre von der Wurzelerweiterung und Wurzelvariation»); and *E. Lidén* (born 1862; »Zur altindischen Wortforschung und Formenlehre»).

In the department of Oriental languages the following deserve to be mentioned: *K. J. Tornberg* (1807/77), celebrated as the editor of important original Arabic authors; *O. E. Tullberg* (1802/53; Syrian manuscripts) *E. Tegnér*, Jun. (comparative phonology); *H. N. Almkvist* (born 1839; Hamitic languages, rabbinic literature, and vulgar Arabic); and Count *C. Landberg* (born 1848; Arabic manuscripts and modern dialects). Prominent among egyptologists stands Professor *K. Piehl* (born 1853), the founder and present editor of the periodical called »Sfinx». As a student of Finnish-Ugrian philology Dr. *K. B. Wiklund* (born 1868; »Entwurf einer urlappischen Lautlehre») has attracted special notice.

Classical studies have mainly taken a practical pedagogic direction. Of those engaged on real research who have attained to any greater significance, there have consequently been but few. Among these are noticed Professors *Kr. Cavallin* (1831/90), lexicographer, text critic, *C. M. Zander* (born 1845), text critic, metrician, and *O. A. Danielsson* (inscriptions, meter).

During the last decades Romanology has, in Sweden, had reason to congratulate itself on a very considerable number of able advocates, who especially have received impulses from the Frenchman Gaston Paris. Old French has been the central subject; edition of texts, the principal achievement of our Romanic scholars. The following have been conspicuous as leaders: Dr. *H. von Feilitzen* (1854/87; editor of Old French texts), Professors *P. A. Geijer* (born 1841), *C. W. Wahlund* (born 1846; editor of Old French and earlier Modern French texts, and known as the owner of a very extensive collection of Romanic works), *P. J. Vising* (born 1855; scholar of syntax, specialist in Anglo-Norman), and *F. A. Wulff* (born 1845; metrician, editor of Old French and Spanish texts, and interpreter of a delicate perception as regards the works of Dante and Petrarch). As Hispanologist *V. E. Lidforss* (born 1833) has made himself known. A rare ability of grasping and judging of even the most delicate shades of style in a foreign language has been displayed by Dr. *G. E. Rodhe* (born 1863), among other works, in his much noted pamphlet against the French decree concerning orthography and syntax. — Sclavonic philology has been neglected in Sweden; it ought, however, to be mentioned, as a glimpse of light, that this science has, since 1891, been represented at the University of Uppsala.

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History.

As in most other European countries, the writing of history began in Sweden during medieval times with annalistic notes in the monasteries. From the beginning of the 14th century, anonymous chronicles written in verse or prose began to appear. The earliest real national history is »Chronica Gothorum» by *Ericus Olai* († 1486), who not only, like his predecessors, enumerated the successive events, but also sought to show their inner connection. From the earlier half of the 16th century there exist several works by the last Catholic Archbishop of Sweden, *Johannes Magni* (1488/1544) and his brother *Olaus Magni* (1490/1558), both deceased in exile. The former published a strictly ecclesiastical history of the archbishopric of Uppsala, as well as an extremely phantastical history of Sweden. The works of his brother are far more significant. He published in Venice quite a remarkable map of the North, which was several times reprinted; and later, in Rome, an extensive and very valuable ethnographical description of Sweden, provided with numerous illustrations.

The greatest Swedish historian during the 16th century was the reformer *Olaus Petri* (1493/1552). By his fine discernment of the real value of the various sources, as well as by his dispassionate view, he is eminently superior to his predecessors and nearest followers. His »Svenska Krönika» (Swedish Chronicle) is one of the foremost works of Swedish history writing. The same century also offers a series of chronicles partly founded on oral statements, about the life and official acts of the various Kings, and a large number of political pamphlets. Much superior to these chronicles is »Scondia illustrata» by *Johannes Messenius* (1579/1636), a political adventurer educated abroad, who after his return to Sweden abjured his Catholic faith, and was employed by the government. On account of secret connections with Poland he was kept imprisoned from 1616 to his death, and then in the prison prepared his great work, which treats of Swedish history »from the Deluge» down to 1616, and which is of especial value for the 16th century. — King *Gustavus Adolphus* began a great work on his own reign, but had only time to finish the introduction, which contains a sketch of the history during the reign of his predecessors of the Vasa dynasty.

Later, archeological researches, nearly connected with the linguistic studies of that day, were carried on with zeal and success. *Johannes Schefferus* (1621/79) published works on philology, history of literature, and political history, bearing witness of wide reading and critical acumen. His works promoted the development of a critical method in historical writing. *Olof Rudbeck* (1630/1702) is a highly gifted representative of the rich culture and experimental spirit of the age. He was an anatomist, a botanist, a poet, an engraver, as well as an archeologist and an historian. In »Atland» he attempted to prove Swedish culture to be of pristine age, and the source of the culture of other countries. This hypothesis, which he advocated with real enthusiasm and great scientific apparatus, created considerable attention and was defended by several successors. The purely historical study was at this time rather neglected. Yet, two foreigners in the Swedish service, deserve mention here, viz., *B. P. von Chemnitz* (1605/78) and *S. von Pufendorf* (1632/94), both official historiographers. They wrote extensive works on the Thirty Years' War; and Pufendorf — the superior of the two — known also as a prominent authority on international law, wrote, besides, the history of Charles X, a work provided with excellent copper plates made from the drawings of the distinguished *Erik Dahlberg* (1625/1703). A living interest in the collection and publication of fundamental historical documents was, moreover, a characteristic of the time. *J. Hadorph* (1630/93) and *J. Peringskiöld* (1654/1720) are prominent representatives of this interest. Also political science now received successful attention.

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Erik Gustaf Geijer.

O. von Dalin (1708/63) was commissioned by the Diet to prepare »Svea rikes historia» (The History of Sweden), a work which by its artistic style greatly contributed towards expanding the historical interest. Greater perhaps than Dalin, as a scientific writer, was the learned *S. Lagerbring* (1707/87), who described the medieval times of Sweden with profound criticism and a greater use of foreign sources than his predecessors. By numerous investigations into details he created an interest in special researches, and attracted pupils. The interest in collecting fundamental documents lasted and as a representative of it may be mentioned *A. A. von Stiernman* (1695/1765). The historiographer *A. Schönberg* (1737/1811) distinguished himself by thorough investigation as well as by the clearness and succinctness of his presentation of facts. About the middle of the 18th century successful attempts were made to describe in a systematic way the Constitutions of that time. — At the end of the century *J. Hallenberg* (1748/1834) made a masterly presentation of the history of Gustavus Adolphus (up to 1626). The memoir literature was especially liked and abundant during the time of Gustavus III (1771/92) and during the beginning of the 19th century. The study of local and of cultural history also received the attention of many authors.

Among the historians of the 19th century *E. G. Geijer* (1783/1847) is the most distinguished, as he is also, by common consent, one of the greatest and most scientific thinkers among the Swedes of his day. His works (The History of the Swedish People up to 1654, and many others) are masterpieces of critical acumen and pithy presentation. More than all his predecessors he recognized the evolution and continuity in history; and with superior genius he has given both social surveys and character sketches. His influence on later historical writing in Sweden has been equally great and healthful. — *A. M. Strinnholm* (1786/1862) treated most of the time of Gustavus Vasa, and published, besides, an interesting and comprehensive work about the oldest cultural history of Sweden. *A. Fryxell* (1795/1881), whose vivid »Berättelser ur Svenska historien» (Episodes from Swedish History) have become real folk-reading, awakened in wide circles the interest in Swedish history and Swedish legends.

The ever increasing necessity of archive studies has made Stockholm, where all the main archives are found, ever more the center of Swedish history writing. A large number of very important series of fundamental documents have been

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published, e. g., »Scriptores rerum Suecicarum medii ævi»; »Documents concerning the history of Scandinavia»; »Historical documents» by the Society for publication of manuscripts concerning Scandinavian history; by the National Record Office: »Diplomatarium suecanum medii ævi» (comprising the time 817/1350 and 1401/1410); the registry of Gustavus I; the proceedings of the Swedish Diet from 1523; by the Foreign Department: the considerable collection of Swedish Treaties; by the Academy of Literature, History, and Antiquities: The writings and letters of Axel Oxenstierna, etc. Among late publishers of fundamental documents should be mentioned *O. S. Rydberg* (1822/99), the conscientious editor of the Swedish Treaties (see above); *C. G. Styffe* (born 1817), specialist in the medieval field; *C. Silfverstolpe* (1840/99); *E. Hildebrand* (born 1848), editor of »Historisk tidskrift» (Historical Magazine), the foremost among present periodicals for Swedish historical investigation; and *P. Sondén* (born 1853).

As is natural, Swedish historical writers have devoted themselves preferably, though nowise exclusively, to the history of their own country. A series of important historical sketches of the history of various periods, founded on comprehensive source studies have been prepared by *C. G. Styffe* (later medieval times), *F. F. Carlson* (1811/87; from 1654 to the beginning of the 18th century); *C. G. Malmström* (born 1822; the so-called »Era of Liberty», 1718/72); and *C. Th. Odhner* (born 1836; the periods of 1632/44 and 1772/86). At the university of Uppsala *H. Hjärne* (born 1848), who is a distinguished scholar in Sclavonic history, has exercised a great influence on a large number of students. At Lund, *M. Weibull* (1835/1902), till his death occupant of the chair of history, was a specialist in the history of Gustavus Adolphus and Queen Kristina; and at the private university of Gothenburg likewise *L. Stavenow* (born 1864) in the history of the 18th century. In Uppsala is to be mentioned also *S. J. Boëthius* (born 1850; among other things a work on the French revolution).

H. Forssell (1843/1901) has published valuable investigations about the economical history of older and more recent times. Among writers on cultural history should be mentioned *H. Hildebrand* (born 1842; Sweden in the Middle Ages, and other works); *Cl. Annerstedt* (born 1839), *Elof Tegnér* (1844/1900), and *H. Schück* (born 1855). The constitutional history of Sweden has been written by *Kr. Naumann* (1810/88) and *E. Hildebrand*. *Ernst Carlson* (born 1854) is preparing a continuation of his father's work on the reign of Charles XII. There should be mentioned besides: *H. Wieselgren* (born 1835), known as a prominent biographer; *T. Westrin* (born 1850; many biographies in the Encyclopedia Nordisk Familjebok); *Ellen Fries* (1855/1900); *A. Hammarskjöld* (born 1848); *K. H. Karlsson* (born 1856); *O. Sjögren* (born 1844), and *E. Svensén* (born 1850), who have also done excellent work in popularizing history. — The staff-general has begun a series of comprehensive accounts of the wars of Sweden (beginning with the war with Russia 1808/09). Among special writers on Swedish war history may be mentioned *J. Mankell* (1828/97), and *G. Björlin* (born 1845). Genealogical investigations are pushed with great interest, and have their own medium in »Personhistorisk tidskrift» (Historical-Biographical Magazine). Also local history has many devotees.

H. L. Rydin (born 1822) and *O. Alin* (1846/1900) have produced important works on Swedish constitutional law (e. g. The Swedish Diet by the former, and The Swedish-Norwegian Union by the latter); also *N. Höjer* (born 1853) and *R. Kjellén* (born 1864) are active in this field. »Statsvetenskaplig tidskrift» (Magazine of Political Science) is the organ of these studies.

As a general opinion it may be held that Swedish historical writing at present is having a rapid and manysided development. While being open to impulses from abroad, it is in the main of a truly national character.

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Archeology, Numismatics, Swedish Ethnography, and Folk-lore.

Oscar Montelius.

The interest in *Swedish antiquities* and *archeological remains* dates from the 17th century. The archeology of that day, whose foremost representative was the famous *Olof Rudbeck* (1630/1702), was too phantastical and chauvinistic to attain to any certain results. Really scientific archeological research took its beginning in Sweden, as in Denmark, as late as about 1830. The Swedish founders of this science were *Sven Nilsson* (1787/1883) at Lund and *B. E. Hildebrand* (1806/84) at Stockholm. Nilsson was actually a zoologist, and introduced into archeology the comparative method of the natural sciences. His description of culture during the stone age is of abiding value. Hildebrand, who was the head of the Historical State museum during more than 40 years, worked zealously for the increase of those collections of the museum which now are among the most considerable in Europe. Two of his pupils, his son and successor, the State antiquary *H. Hildebrand* (born 1842), and Professor *O. Montelius* (born 1843) have both, and especially the latter, contributed in an essential degree towards the development of system and method in the prehistoric science. They introduced into archeology the so-called typological method, which has for its object to show the gradual change in form of the archeological finds, their development out of one another, and which has become of paramount importance to the science. Hildebrand's work »Bidrag till spännets historia» (Contributions to the History of the Clasp), and Montelius' work »Om tidsbestämning inom bronsåldern med särskildt afseende på Skandinavien» (Determination of Time during the Bronze Age, with special Reference to Scandinavia) are excellent examples of what results may be reached by that method. The same investigators have both in their works not only treated of the prehistoric periods of the North, but also extended their researches to other parts of Europe as well as to the Orient. Thus, Montelius has made a profound study of the prehistoric culture of Italy, and published in French the first part of an extensive work on this subject. — Among those who have augmented, by scientific excavations, the prehistoric material of Sweden should be mentioned especially *Hj. Stolpe* (born 1841), who has made very extensive investigations (especially at Björkö), with exemplary accuracy and penetrating observation. — Official periodicals are: Antiqvarisk tidskrift (Magazine of Antiquities) and Månadsblad (Monthly Review), both published by the Academy of Literature, History, and Antiquities.

The initiative to researches in Swedish **numismatics** was taken by *E. Brenner* (1647/1717) in his celebrated work Thesaurus nummorum sucogothicorum. Among his successors should be mentioned *K. R. Berch* (1706/77). *B. E. Hilde-*

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brand has published descriptions of Swedish medals, *H. Hildebrand* of Swedish medieval coins, and *A. V. Stiernstedt* (1812/80) of copper coins etc. Large treasures of foreign silver coins from the 9th—11th centuries are frequently found in the Swedish soil. Next to Russia, Sweden is also the richest depository of old Oriental coins. Certain groups of these coins (preserved in the Myntkabinettet) have been treated of in comprehensive monographies. Thus *B. E. Hildebrand* has described the Anglo-saxon coins, and *K. J. Tornberg* (1807/77), in his work Numi cufici regii numophylacii Holmiensis, the Oriental ones. — *B. E. Hildebrand* has published a large work of engravings of Swedish seals from medieval times.

Dr. *A. Hazelius* (1833/1901) has done imperishable service to Swedish **ethnography** (and Northern ethnography in general) by his grand creation, the North Museum in Stockholm (about which cf. the preceding). Thanks to his wonderful energy, this museum with its annex, the open air museum Skansen, has from a modest beginning attained such proportions that it is at present the foremost of its kind in Europe. Within its precincts are collected an immense material for the study of Swedish folk-life during the last 3—4 centuries; the scientific treatment of this material has only just begun. A very excellent monography about Lappland and the Lapps has been prepared by *G. v. Düben* (1822/92).

Folk-lore investigations are as yet quite undeveloped in Sweden. As a classical work on this topic may be mentioned »Värend och virdarne» (Värend and its inhabitants — Värend being a part of the province of Småland) by *G. O. Hyltén-Cavallius* (1818/89). Also *L. F. Rääf* (1786/1872) and *R. Dybeck* (1811/77) devoted themselves with interest to this science. In later years much folk-lore material has been published in the periodical De svenska landsmålen, issued by professor *J. A. Lundell* (born 1851), and in the publications by the North Museum. Quite recently the collection of such material has received a new impetus by the systematic investigations of the Swedish dialects undertaken by university teachers and students at Uppsala.

History of Literature.

The history of literature is in Sweden, as in other countries, a comparatively young branch of learning, and its development with us has passed through much the same stages as in other countries.

It began as a branch of philological bibliography. Our oldest work on the subject is *J. Schefferus'* (1621/79) Svecia Litterata (1680), a list of books excellent for its time, and this was followed by a number of other bibliographies still existing in manuscript. During this first period people were almost exclusively interested in the history of learning, and it was very common for a person to treat the literature of a particular town or province. Most of these works, however, are merely chaotic collections of notices, destitute alike of any historical or esthetic value.

Under the influence of the French *éloges* a new start, introduced by *O. von Dalin* (1708/63), was made in the 18th century. Learned notices fell into contempt, and the chief stress was laid on an eloquent presentation, which culminated in bombastic and empty panegyric.

With the advent of the Neo-Romantic school the history of literature in Sweden assumed, as elsewhere, a learned shape. The Neo-Romanticists were more erudite, and held broader views than the old academicians, and they were, for that reason, undeniably better fitted to do justice to past ages. But at the beginning of that century all learning was dependent on philosophy, and, in consequence of this, the history of literature now became a branch of philosophy,

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after having previously been philological. The history of literature and art were now considered as applied esthetics. This tendency was introduced by the pioneering work of *L. Hammarsköld* (1785/1827), »Swedish Literature» (1818), which, however, is now oldfashioned. On the other hand, a work which has still a scientific value, is the clever and delightful »Swedish Seers and Bards» (1841/55) by *P. D. A. Atterbom* (1790/1855), a chronological series of portraits of Swedish poets, delineated with a psychological delicacy and noble breadth of view that reminds one of Sainte-Beuves. This tendency reached its perfection in *G. Ljunggren* (born 1823), from whose hand we possess a fine esthetic examination of Bellman's poetry, a history of the Swedish drama up to 1665, and, finally, an extensive and conscientious history of Swedish poetry from the death of Gustavus III down to the middle of the 19th century.

Amongst our younger historians of literature a new tendency, however, has made itself felt, partly in consequence of the influence of Taine and Brandes. For them literary history is no longer esthetic or philological, but a branch of history, and the history of Swedish literature is conceived by them as the history of Swedish culture, as far as this falls within the domain of literature. The chief weight is therefore laid on showing how literature itself reflects the humour of the people, the period itself, and the peculiar individuality of an author. This view is held more particularly by the pupils of *C. R. Nyblom* (born 1832), among whom is noticeable *H. Schück* (born 1855), Professor in Uppsala, *K. Warburg* (born 1852), Librarian of the Nobel Institute of the Swedish Academy, and *O. Levertin* (born 1862), Professor at the Private University of Stockholm.

Besides other works, Schück has published the first volume of an extensive History of Swedish Literature, and has, together with Warburg, written a less comprehensive sketch of Swedish literature down to the most recent times. Warburg has enriched literary history with several interesting monographs, and Levertin is known for a series of splendid delineations of the days of Gustavus III. Among other authors the following may be noticed: *C. D. af Wirsén* (born 1842), Secretary of the Swedish Academy, *E. Wrangel* (born 1863), Professor at Lund, and *O. Sylwan* (born 1864), Professor at the Private University of Gothenburg.

History of Art.

The History of Art is also a recent science in Sweden. It was Neo-Romanticism, in the beginning of the 19th century, that called it into being. The ardent champion for the »New School», *L. Hammarsköld* (1785/1827), in 1815, gave lectures upon the subject, which, in 1817, appeared in print. But the first to undertake any researches was *K. G. Brunius* (1792/1869), professor of Greek but also an architect and art historian, in which latter capacity he, already in 1836, began to write about our old churches, which he studied by traveling about in the country. Next to that, text-books were being written and lectures held upon the subject: that being done by *K. J. Lenström* (1811/98), who, in 1848, published his Handbook in the History of Fine Arts; this, by *A. Sohlman*, who, 1849/68, was a teacher in History of Art at the Academy of Arts and during that period published »Treatises and Essays on subjects out of Cultural and Art History». Now the ice was broken, and in 1867 the first modern work arrived from Finland — »History of the Fine Arts, from the end of the 18th century», by *C. G. Estlander* (born 1834). Shortly after — 1872/76 — *Fr. Sander* (1828/1900) published his fundamental work »The National Museum, contributions to the history of the picture gallery», the fruit of his function as an amanuensis at the National Museum, besides which he, at a

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later period of life, wrote a monograph on K. F. v. Breda. Another amanuensis (at the Royal Library) *Kr. Eichhorn* (1837/89) has by his writings and collections done services of priceless value to Swedish history of art. Thus, he wrote »Swedish Architecture», an appendix to the History of Architecture by Lübke (1871); many essays on art and industrial art, collected in »Swedish Studies», in three series of 1869, 1872, and 1881; »A short Summary of the History of the Imitative Arts» (1881); and a series of notable articles on Swedish history of art in »Nordisk Familjebok» (Swedish Encyclopedia). A third amanuensis (at the National Museum) is furthermore to be mentioned, namely *O. Granberg* (born 1858), an art investigator who has gained reputation even abroad for his research about »Pieter de Molijn de oude» (1883), on the strength of which this Dutch landscape-painter was installed into his proper place in history; furthermore, he has drawn up catalogues of pictures by old masters in private collections (1886) and, finally, he has published a large work about »The picture gallery of Queen Kristina» (1896). A prominent place in this department is also occupied by *Viktor Rydberg* (1828/95), who wrote excellent treatises on »The Aphrodite of Melos», on »Roman Emperors in marble», on »Antinous», and, moreover, at the University of Stockholm (after 1889), held very celebrated lectures on ancient and modern art. — As a professor at Uppsala, *C. R. Nyblom* (born 1832) has, since 1865, lectured on history of art, written monographs on Sergel, Adelcrantz, and Scholander, drawn up a catalogue of the Uppsala University art collections, written about Uppsala cathedral and the new University Palace, and, in »Nordisk Familjebok», contributed with most of the articles on foreign art. Among Uppsala men may be noted: *G. Upmark* (1844/1900), a versatile author, who has written about palaces and churches, about copper plates and textile fabrics, as well as achieved a grand work on the Renaissance in Sweden (1892/1900), published in German; moreover, he has written articles in »Nordisk Familjebok», and exercised a considerable influence in his capacity of intendant at the National Museum; *G. Göthe* (born 1846), whose principal work is about Sergel, but who, besides that, has drawn up the model catalogues of the pictures in the National Museum and has lectured on art; *L. Looström* (born 1848), author of the History of the Academy of Arts and having, moreover, compiled catalogues and treated many questions concerning industrial art; *O. Levertin* (born 1862), who has lectured on art at the Private University of Stockholm and written about Nik. Lafrensen, Jun., and G. Lundborg; *K. Warburg* (born 1852), who has lectured on the subject in question at the Private University of Gothenburg and written about Hedlinger and Velasquez; *C. G. Laurin* (born 1868), who is the author of the first complete History of Art written in Swedish (1900) and provided with a beautiful selection of illustrations; and *A. Hahr* (born 1868), who has published monographs on P. Krafft, Sen., and D. v. Krafft. An exceptional position is held by *J. Böttiger* (born 1853), who has described Drottningholm and the bronze works by Adrian de Fries to be found in Sweden and has written a great work about Sweden's treasures of tapestry. An equally independent position is, finally, taken up by *G. Nordensvan* (born 1858), who has treated the subject of »Swedish art and Swedish artists in the 19th century», also delineated the history of imitative arts in all countries during the same era (1900) and described the Royal Castle at Gripsholm with its treasures of portrait-paintings.

Esthetics.

Considered as a science, esthetics is in Sweden little older than history of art, for among Swedes, the science of the beautiful was introduced from Germany along with neo-romanticism. This fact did not, however, prevent certain negative

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prognostics from being experienced during the 18th century — the natal time of criticism. As a teacher of good taste *Olof v. Dalin* (1708/63) appeared already in 1736 with his »Thoughts about criticisms», and in his »Short observances on Swedish art of poetry in our days» he laid down rules for the forms of poetry. *J. H. Kellgren* (1751/95) towards the end of the century exercised a still greater influence through his criticism in the »Stockholm Post» (from 1778), about whom it became a saying that »he was the national wit and worked like it». He emanated from Voltaire, whereas *K. G. af Leopold* (1756/1829), his contemporary and brother in poetry, kept to the Englishman Locke, but in his esthetic speculations he is weaker than in his quality as a mere philosopher. *Tomas Thorild* (1759/1808) — the antagonist of both — was the arousing game-cock of the new time. He emanated from Rousseau and adored Nature; he opened new prospects for polite literature and gave utterance to truths proving him to have stepped in advance of his time. His principal work in this respect was »A Criticism on criticisms» (1791), where he is grand in views and brilliant in style but also violent in self-sufficiency and in slighting his antagonists. The neo-antique tendency (that of Sergel) had its esthetic, too: *K. A. Ehrensvärd* (1745/1800), who in »The Philosophy of Arts» and »Travels in Italy» sets up antiquity as the only actual ideal.

At the beginning of the 19th century, the philosopher *Benj. Höijer* (1761/1812) made his appearance; even earlier than the German Solger, who is generally considered to have been the first, he had arranged an esthetic system of note, with an exposition of the esthetic ideas, which is still of validity in our days. *P. D. A. Atterbom* (1790/1855), in standing up for the rights of imagination and feeling within the precincts of poetry and art, and as the chief man of the »New School», excercised a great influence on the remodeling of the esthetical ideas. His opinions he laid down in his criticisms and in »Seers and Bards» (1841/55). *L. Hammarsköld*, mentioned above, has worked in the same direction, mostly by criticism. A contemporary of Atterbom was the philosopher *S. Grubbe* in Uppsala (1786/1853), who has written lectures on »The Philosophy of the beautiful and of art», distinguished for a sound perception and a clear style. The successor of Atterbom at Uppsala, *B. E. Malmström* (1816/65), worked as a teacher principally in the department of history of literature, but in his posthumous »Esthetic treatises» he places himself chiefly on the standpoint of Hegel, and as a model he put the classical ideal highest. His colleague in Lund, *G. Ljunggren* (born 1823), has also devoted himself chiefly to history of literature, but his »Comparison between Ehrensvärd and Winckelmann as philosophers of art» and his »Exposition of the principal esthetic systems», which for many years has served as a text-book in Lund and Uppsala, entitle him to a place here too. Likewise *Viktor Rydberg* (1828/95), who during his lectures at the Private University of Stockholm (from 1889) went through the theory of art, its origin and development, and who, besides, has often sprinkled his writings with deep and well expressed thoughts about the beautiful and its manifestations in poetry and art. *C. R. Nyblom* (born 1832) has published »Contents and form of Art», a critical dissertation, »Principal ideas of the doctrine about the beautiful», an attempt at empirical esthetics, and — in the Encyclopedia Nordisk Familjebok — the articles on »Humor» and »Irony», »Comic» and »Tragic». At the side of him may be mentioned the Uppsala men: *D. Klockhoff* (1840/67), who wrote »About pantheistic esthetics» (1864) and »About the tragical» (1865); *I. H. Solander* (1843/82): »Theistic esthetics in Germany» (1866); *K. A. Melin* (born 1849): »Guilt in tragedy» (1875); *F. v. Schéele* (born 1858): »The doctrine of Grubbe on the beautiful»; and *E. Petrini* (born 1856): »Zimmermann's theory about the general forms of esthetics» (1889).

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Pedagogics.

When the Reformation had gained a firm footing in Sweden, a very warm interest in pedagogics began to spring up. More especially Bishop *L. Paulinus Gothus* (1565/1646) was full of zeal for the education of the young as well as for public instruction. He published several works on these subjects, speeches, catechetical papers, etc., Gothus, as well as the tutor of Gustavus II Adolphus, *J. Skytte* (1577/1645), who also gained renown as an author of educational essays, was an adherent of the pedagogical ideas of the Frenchman P. Ramus. An opponent to these men was the ardent champion of the Neo-Aristotelianism, the versatile *J. Rudbeckius* (1581/1646), the greatest Swedish pedagogue of the 17th century, and a very eminent man. He was most active as educator and teacher at the University, and still more so as Bishop in Vesterås, where he founded our first college. Classical languages and theology had, up to this time, been almost the only objects of instruction. Rudbeckius introduced the study of several other subjects, such as natural science and modern languages. — Here is also to be mentioned a law for the high schools, a very excellent one for that time, issued in 1649. A complete system of pedagogics for the schools is there given under the title of »detailed hints for teachers». It is chiefly the ideas of the pedagogues Vive and Comenius that this law has tried to express. — During the latter part of the 17th century many of the most eminent churchmen worked with great zeal on propagating the knowledge of reading among the peasantry. Thus, *J. Gezelius*, Sen. (1615/90), compiled complete schemes of instruction for country and other schools.

Our most glorious scientific period, the so-called »Era of Liberty», was conspicuous for the great interest shown in pedagogics, practical education being more the aim than previously. *E. Eklund* (1712/66) then published an extensive »Manual of Education», and *J. Browallius* (1707/55) issued several pedagogical papers. The latter, among other things, favoured the use of natural sciences in the education of the young. In the beginning of the 19th century there appeared one of the noblest men in the history of Swedish Pedagogics, *K. U. Broocman* (1783/1812), a pupil of Pestalozzi, unusually gifted as a teacher and equally active as an author. He published his opinions and teachings in a pedagogic periodical, »Magasin för föräldrar och lärare» (Magazine for Parents and Teachers), the first real periodical of its kind published in Sweden.

Among persons eminent in the 19th century as authors on pedagogical matters, should be mentioned *K. A. Agardh* (1785/1859), *E. G. Geijer* (1783/1847), and *A. Fryxell* (1795/1881) — celebrated also on other fields of culture. To this period belongs also the origin of Swedish Gymnastics, whose creator was *P. H. Ling* (1776/1839). During the same century great interest has been shown in the advancement of popular education, and in the improvement of instruction by the use of new cultural elements and the application of new pedagogical principles. *T. Rudenschöld* (1798/1859), *P. A. Siljeström* (1815/92), and *F. F. Carlson* (1811/87) are the greatest reformers on the fields of popular education. *Anna Sandström* (born 1854), at present the most eminent author on educational and pedagogical subjects, has done more for the education of women than anyone else in Sweden. She advocates a concrete object instruction, history, geography, and natural science being the chief subjects. In instruction she favours realism not as opposed to humanism, since she lays great stress on the precedence that should be given the humanistic subjects, but as opposed to formalism, above all formalism in language instruction. Her views are disseminated chiefly by »Verdandi», a pedagogic Magazine edited by her since 1883. — The originator

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Anna Sandström.

of the Swedish pedagogic system of sloyd, *O. Salomon* (born 1849), calls for mention here. He has specially treated the question of sloyd and its importance as regards education. See further page 300.

In practical pedagogics, an ardent reformatory work has, during the last decades, developed itself in Sweden. Amongst the number active in this department ought to be mentioned *S. v. Friesen* (born 1847), formerly college rector, who has deserved well of raising the standard of the scientific line at our colleges; *S. Almquist*, college rector (born 1844), who has exercised a manysided, theoretical as well as practical activity; *L. Wœrn* (born 1846), rector at the Higher Seminary for Lady Teachers; *L. Lindroth* (born 1845), rector at the Beskow school, a private institution in Stockholm; *G. Sjöberg* (born 1844), former manager of a college for young ladies in Stockholm; *Ernst Carlson* (born 1854), lecturer and formerly professor, who by motion at the Riksdag has taken the initiative to the forming of the latest Committee on secondary instruction (cf. page 317); *Th. Krok* (born 1834), formerly college master, highly meritorious in natural history instruction; *C. Kastman* (born 1832), the former, and *I. Lyttkens* (born 1844), the present chief of the bureau of common school education at the Department of Ecclesiastical affairs and education; and *Fridtjuv Berg* (born 1851), common school teacher in Stockholm. On the precincts of the People's High Schools considerable forces are at work; we will only mention the names *L. Holmström* (born 1840) and *T. Holmberg* (born 1853). Significant for the development of Swedish pedagogics is the foundation in the capital of a pedagogical *library*, to which the initiative was taken by *N. Lagerstedt* (born 1847). A desideratum is still the foundation of pedagogical professorships at our universities.

Political Economy and Sociology.

Economic Science in Sweden has hitherto mostly developed under a strong influence from that of other civilized nations. The first author worth mentioning in this department in our country, *J. Rising* (1611/72), was a warm adherent of the liberal Dutch school. Among the ideas of the mercantile system he, however, adopted some, principally the interest for colonizing, for efforts to increase the population, and for laws against luxury. Of a much more mercantile character were the works of A. Bachmanson (1697/1747; ennobled *Nordencrantz*) and *A. Berch* (1711/74). The latter was nominated the first Swedish professor of Economy (at Uppsala, from 1741) — this being the second in Europe — and he was known both at home and abroad as a distinguished thinker and systematizer. As one of the most notable »Smithians before Adam Smith» ought to be mentioned the Finlander *A. Chydenius* (1729/1803), whose most important works, treating the politics of population and trades and industries, were published about 1760. The councillors of Gustavus III, *K. F. Scheffer* (1705/86) and J. Westerman (1730/1815; ennobled count *Liliencrantz*), were influenced by the physiocratic school. They introduced some reforms, such as a mitigation in the constraint of guilds, etc.

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During the first part of the 19th century we find Swedish political economy developing under a strong influence of the doctrines of Adam Smith and the »classical political economy» of England, Germany, and France. There are, however, also works with a mercantile tint, e. g. those of *L. G. Rabenius* (1771/1846). From the middle of the century two other systems oppose each other: on the one side the old protectionism, and on the other the »liberal» or individualistic tendency that had and still has its chief home in France. Original Swedish works — mostly in the form of pamphlets or short essays — during that period chiefly treated practical-political questions. As the most distinguished among the authors of this class *H. Forssell* (1843/1901) may be mentioned. A particularly meritorious account, from a liberal point of view, of »The political Economy of Sweden's so-called Era of Liberty» was published by *V. Arnberg* (1832/1900).

It is in fact not until about 1880 that the German historical and social-political school began to influence Swedish research. In a joint publication, called »Ekonomiska Samhällslifvet» (The Economic and Social Life), *partly* founded on German works of this kind, *J. Leffler* (born 1845), *A. Raphael* (born 1850), *G. Sundbärg* (born 1857), *C. Rosenberg* (born 1843), a. o., have given an account of the different parts of political economy. *Leffler* has also among other works, published a condensed digest of national economics (»Grundlinier», 1881) and also outlines of the economic life, especially of the modern »capitalistic» society (»Nationalekonomiens grunddrag», 1902). *Raphael* has published several comprehensive accounts of earlier and modern social legislation of Sweden and of other countries as well as of the Labour question, especially on conciliation and arbitration, and finally of the habitation question. *D. Davidson* (born 1854) has published a history of the theory on the rent of land, works about the central banks of Europe, the income-tax, etc. The mathematically talented *K. Wicksell* (born 1851) is an adherent and developer of the theories of the Austrian school. In works, published in German, he has especially considered the problems of taxes and money from a theoretical point of view. Of his broadly planned Swedish »Lecture on national economy» has appeared hitherto only vol. I of the first, theoretical part (1901). *G. Steffen* (born 1864) is the author — besides of spirited sketches from English social and economic life, etc. — of a work in Swedish on the history of the labouring classes in England, two parts (1894/99), whose p. I has appeared, enlarged, in German (1901). An investigator of decidedly political-social tendency is *P. Fahlbeck* (born 1850), known also as statistician. Of late years *G. Cassel* (born 1866) has made his appearance as an assiduous and successful author on the subjects of political economy and financial science.

An endowment by legacy of *V. E. Lorén* (1858/85) has made possible the publication of important series of more or less independent social-scientific works, entitled: »Skrifter utgifna af Lorénska Stiftelsen»; I—XVII, 1890/99 (Essays, published by the Lorénian Foundation). Most of these pamphlets treat social phenomena in Sweden, and the series in full has prepared the way for the introduction into Sweden of modern labour-statistical research. Other valuable series of publications are: Proceedings, published by the Political-economical Society in Stockholm (founded in 1877); »Ekonomisk Tidskrift» (Economical Review), published in Uppsala since 1899, under the editorship of Professor *Davidson;* and »Statsvetenskaplig Tidskrift» (Magazine of Political Science), published since 1897, at present edited by Professor *Fahlbeck* in Lund. Of great interest are the official researches in labour statistics, which have been carried on since 1897.

Within that science which under the name of **sociology** has begun to restrict itself from political economy, but is nearly related to the latter as well as partly to philosophy — is to be noticed *G. Björklund* (1846/1903), known for several original and penetrating philosophic-sociological and also purely philosophical works.

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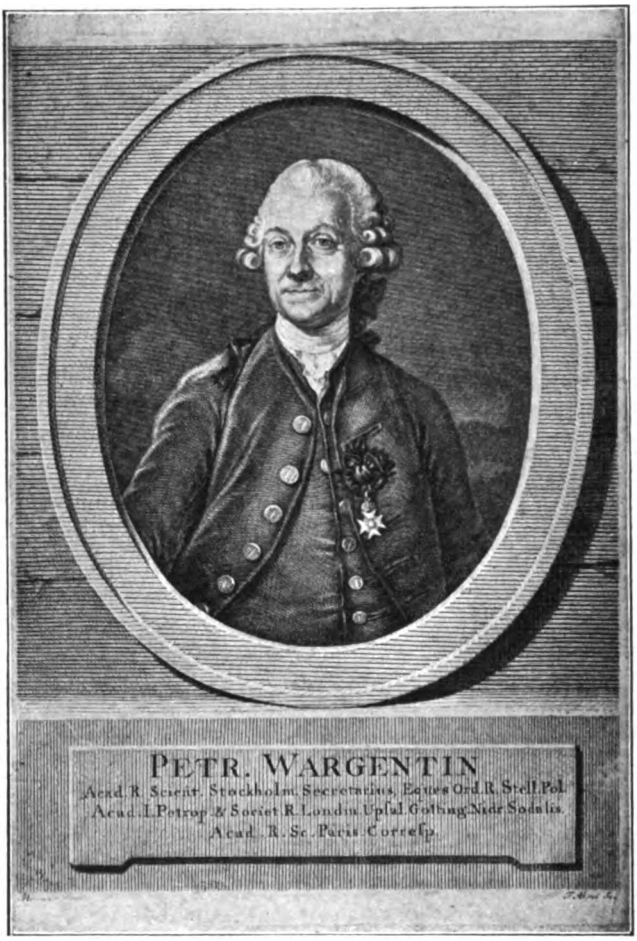
Statistics.


PETR. WARGENTIN
Acad. R. Scient. Stockholm. Secretarius. Eques Ord. R. Stell. Pol.
Acad. I. Petrop. & Societ. R. Londin. Upsal. Gothaeg. Nidr. Sodalis.
Acad. R. Sc. Paris. Corresp.

Peter Vilhelm Wargentin.

Of the origin of Swedish *Statistics of population* (during 1738/56) and of the high value which from its very first appearance must be attributed to it we have above (p. 197) given an account. Archbishop *E. Benzelius* (1675/1743) was the first to enter upon this new field of research; the plan of organization was laid out by *P. Elvius* (1710/49) and followed up by the Astronomer *P. V. Wargentin* (1717/83), who also subjected the new material to a scientific treatment.* To this day, the Swedish Statistics of Population is not only the most comprehensive and authentic, but also the most completely worked out that any nation possesses.

In *other* statistical branches, Sweden certainly does not take the same high position as in demography, but even in them we meet an uncommon wealth of statements from olden times and a rare continuity of the work. Also Swedish Statistics of to-day holds, in most cases, good when compared to that of other countries. Our *factory Statistics*, that gives an account every year on the number of factories and their hands, and also of the *quantities* as well as of the value of the manufactures, is the most complete of the kind that any country can present. A speciality of Swedish Statistics are the *quinquennial reports* of the province governors, ordered to be made out already in 1634, and regularly published since 1822.

* Wargentin's Tables of Mortality, the oldest rationally computed ones existing, have often been unfavourably mentioned as unscientific, especially by German authors. In an article by G. Enestrom — »P. W. Wargentin und die sogenannte Halley'sche Methode», 1899 — it has lately been shown that these attacks are only founded on a misconception.

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Our oldest Statistic Government Office, the *Commission for Tables* of 1756, the oldest of its kind in Europe, was reorganized in 1858 into the present *Central Bureau of Statistics*, whose first Chief was the physician *Fr. T. Berg* (1806/87), eminent in many departments and in statistics chiefly active on the field of vital statistics. In 1879, Berg was succeeded by *E. Sidenbladh* (born 1836), who, in 1901, was succeeded by *K. Sidenbladh* (born 1840). The work of the Office is divided on three departments, administered at present by *K. G. Odén* (born 1846; Parish Poor Relief and Finances; Electoral Statistics), *E. Söderberg* (born 1849; Agricultural Statistics, the Quinquennial reports, etc.), and *G. Sundbärg* (born 1857; Population and Savings-banks). Among the statistic bureaus within the administrative Government offices may be mentioned the two in the Board of Trade (Kommerskollegium). The one, superintended by *Hj. Gullberg* (born 1847), publishes the Statistics of Industry and Mining and of Commerce and Navigation; the other edits the Social Statistics, at first conducted by *J. Leffler* (born 1845) and at present by *H. Elmquist* (born 1871).

Among Swedish authors in statistics from more distant times ought to be mentioned *J. Gråberg till Hemsö* (1776/1847), who settled in Italy, where he is considered to have contributed in no small degree towards calling forth an interest for statistical researches. Of newer non-official works there are to be noticed comprehensive statistic manuals of Sweden by *K. G. af Forsell* (1783/1848), *K. A. Agardh* (1785/1859), and *C. E. Ljungberg* (born 1820), of whom the two latter jointly published a famous work: Statistics of Sweden (1852/63); further, the statistical manuals issued by *E. Sidenbladh* for the International Exhibitions of Vienna (1873), Philadelphia (1876), and Paris (1878). For the World's Fair at Chicago 1893, a similar publication was issued by *S. A. Löfström* (1847/98). Among other authors may be mentioned *H. Forssell* (1843/1901; cf p. 197), *J. Hellstenius* (1834/88), who has efficiently contributed towards popularizing the demography in Sweden, *P. Fahlbeck*, professor at the University of Lund (born 1850; principal works: The National Wealth of Sweden, The Nobility of Sweden, The Statistical Type), *I. Flodström*, Actuary in the Board of Trade (born 1856; commerce and trade, amongst other works a noteworthy monography on the Län of Vesternorrland), *K. Key-Åberg*, likewise Actuary at the Board of Trade (born 1861; industrial and social statistics), *H. Malmgren* (born 1856; trade- and social statistics), and *E. Svensén* (born 1850; electoral statistics). The Mathematical Statistics have been treated by *G. Eneström* (born 1852). Medical Statistics of Sweden commands an exceptional material for times gone by, which, however, as yet has been but little made use of. The results to be attained by means of it may be seen by special works of *E. Almquist*, professor in Stockholm (born 1852) and Dr. *G. Bergman* (born 1837). The conditions of later times, especially in Stockholm, have been treated by *K. Linroth* (born 1848), Chief of the Medical Department. — A municipal bureau of statistics for Stockholm is at present under organization; yet annual reports have been published for more than thirty years by *M. Rubenson* (born (1834), secretary of the Town Council; and for Gothenburg the publication of similar reports has recently begun.

On the whole, the statistical literature of Sweden has, of late years, gained considerably in extent and interest and has begun to occupy a more independent position than formerly in relation to political economy. To this result has also contributed the circumstance of Statistics having lately been introduced by *P. Fahlbeck* as a university subject of study, at the university of Lund.

To the »Statistique internationale» Sweden has contributed with the volume »État de la population, I» (Stockholm 1876), compiled by *Berg* and *Hellstenius*. Since 1895, »Statistiska öfversiktstabeller» (Aperçues statistiques internationaux) have been published every year, by *G. Sundbärg*, in »Statistisk Tidskrift» (Sweden's official Journal of Statistics).

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Medicine.

The Swedish School of Medicine is in our days of a very high standard, attained through the thorough clinical instruction of prominent teachers; and also Swedish science and learning in the dominion of Medicine has a well founded reputation in other countries. In many parts of Sweden excellent hospitals have also been unsparingly erected during the last two decades.

Olof Rudbeck.

The development of **Anatomy** in Sweden, as in other countries, has been closely united with that of the Medical science, to which a knowledge of the construction of the human body is fundamental. The first instruction in Anatomy, of which we have any record, took place in the beginning of the 17th century in Uppsala at the private Medical College directed by the brothers *J.* and *P. Rudbeckius*. In 1613 the first professorship of Medicine was founded at Uppsala, when *J. Chesnecopherus* was made professor »of Physiology». In 1624 the second Chair of Medicine was founded, to which *J. Frank* was appointed, who also for a long time conducted the instruction in anatomy. There did not exist yet, however, any dissecting-room, and the prejudice of people against the dissection of the human corpse put great obstacles in the way. *Olof Rudbeck* (1630/1702) was the real pioneer of anatomical science in Sweden. This ingenious, energetic and manysided man, who already at an early age became famous through his discoveries about the chylous and lymphatic systems, was the first who succeeded in introducing dissection of the human body, which, in order to lesson people's aversion, was performed with very great ceremony. Contemporary with O. Rudbeck, *P. Hoffvenius* (1630/82) was at work in Uppsala, renowned also for his lectures on anatomy. Among later anatomists at the University of Uppsala may be named *A. Murray* (1751/1803), a distinguished lecturer and author, and *F. E. Sundevall* (1811/81), who instituted the Anatomical Museum. *E. Clason* (born 1829) has perfected the museum, and issued various works on Anatomy. *I. Sandström* (1852/89) discovered glandula parathyreoidea. *J. A. H. Hammar* (born 1861) is at present conducting the instruction in histology and embryology, and has published several works; *J. V. Hultkrantz* (born 1862) is in charge of the instruction in macroscopical anatomy, and has devoted himself to studying the joints and anthropology, and *J. Broman* (born 1868), who has written several treatises on subjects relating to embryology and histology, especially the spermatozoa.

In Stockholm the instruction of anatomy has been under the auspices of *Collegium medicum* ever since the end of the 17th century. Among the instructors may be noticed *Urban Hjärne* (1641/1724), *L. Roberg* (1664/1742), *Abraham Bäck* (1713/95), *Roland Martin* (1726/88), the surgeon *Olof af Acrel* (1717/1806), and *A. J. Hagström er* (1751/1830), during whose time the regulations at the Caroline Institute (the Faculty of Medicine in Stockholm) were confirmed in 1815 and 1822.

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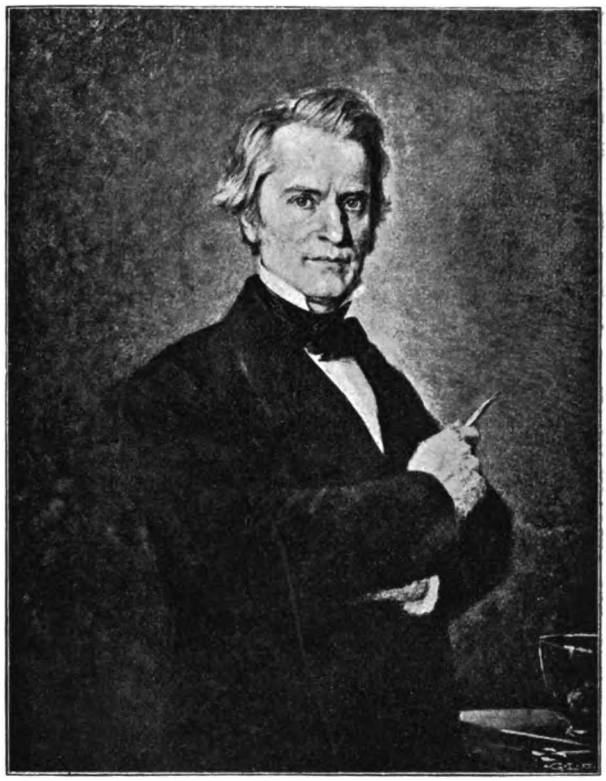

Anders Retzius.

In 1824, *Anders Retzius* (1796/1860) was appointed to the chair of Anatomy and Physiology, and in 1830 nominated professor and inspector of the College; the instruction in the dissecting-room was systematized, and from that time was here introduced the very renowned method of dissection in use in our country; around him gathered a great number of interested pupils and colleagues; anatomy as well as other departments of Medicine made a new start. Contrary to the philosophical and speculative tendency then generally prevailing, this Institute was made the center of that new conception, according to which observation of nature is the essential, and Medicine, on the basis of anatomy and physiology, is a natural science. Through his zeal and talent as a teacher, A. Retzius exercised a reviving and invigorating influence, and through his scientific works and his discoveries in microscopical as well as in macroscopical anatomy, and not least in craniology, he gained European celebrity. *G. von Düben* (1822/92) embraced anthropology with particular interest. *Chr. Lovén* (born 1835) discovered the organ of taste in mammals, and the lymphatic vessels of the stomach etc. *A. Key* (1832/1901) at first devoted himself to normal histology, to the organ of taste in batrachia, the structure of the spleen and the kidneys, etc. *G. Retzius* (born 1842), who together with Key has published an extensive work on the nervous system, its lymphatic channels and tissues, afterwards applied his scientific investigations partly to anatomy, macroscopical as well as microscopical, partly to anthropology and ethnography. In anatomy he has above all dealt with the structure of the organs of sense, especially that of the organ of hearing, and of the nervous system. By this, and not least by his researches on the nervous system of the lower animals, he has to a considerable extent contributed to the great improvement made of late in this field. *E. Müller* (born 1866) has contributed a series of works on various departments of anatomy, especially the glands, the neuraglia, and the blood vessels. *E. Holmgren* (born 1866) has published several works on the finer structure of the nerve cells and other cells. *O. Andersson* (1871/98) has contributed to the knowledge of the thyroid gland.

In Lund a special professorship of anatomy was founded in 1783. The first, however, who raised anatomy to a more prominent position, was *A. H. Florman* (1761/1840); he was a zealous investigator and teacher as well as an

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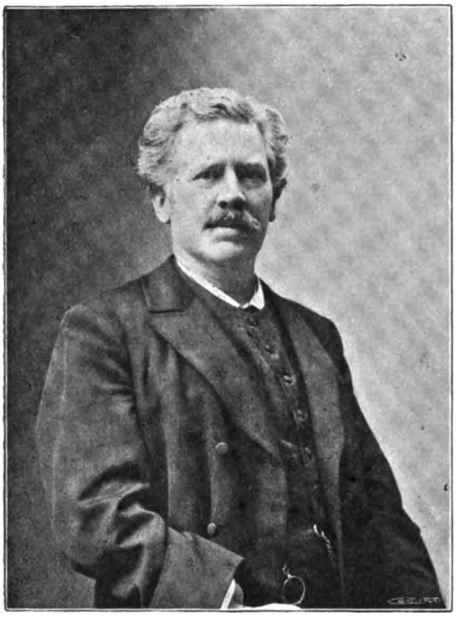

Gustaf Retzius.

industrious author. Among the now living anatomists at this university may be named *M. V. Odenius* (born 1828), whose works in the normal histology embrace the nerve-endings of the organ of hearing and the hairs; *Hj. O. Lindgren* (born 1837), author of works on the structure of the uterus and the ovum, *C. M. Fürst* (born 1854), who has published works on the structure of the spermatozoa, as well as in other departments of anatomy and histology.

Swedish **Physiology,** earlier united, as is the case everywhere, with anatomy, gained its first independent representative in *Fr. Holmgren* (1831/97) at Uppsala, noted most through his works on vital electrical phenomena, and on colour-blindness. Holmgren fitted up the first Swedish physiological laboratory at Uppsala and yet another, a magnificent one, in the same town, erected by legacy of the late Swedish physician and patron of arts and sciences *A. F. Regnell* (1807/84), who resided in Brazil. *Holmgren*, moreover, together with *R. Tigerstedt* (see below), founded the journal »Scandinavisches Archiv für Physiologie», printed at Leipzig. Holmgren's successor, *Hj. Öhrwall* (born 1851) is noted for his work concerning the organ of taste. *T. Thunberg* (born 1873) has studied the physiology of the cutaneous sensibility. — The first professor of physiology at the Caroline Institute was *Chr. Lovén* (born 1835). He has essentially contributed to the discovery of the vaso-motor nerves, has thrown light upon the nature of muscular contraction, etc., and arranged the physiological laboratory at this Institute. Subsequently the Finlander *R. Tigerstedt* (born 1853) was here active for a period of twenty years as a scientist, lecturer and writer on the general physiology of muscles and nerves as well as on the physiology of circulation and nutrition. *J. E. Johansson* (born 1862) has among other things made studies on the relationship of nutrition to muscular action in the human organism. *C. G. Santesson* (born 1862) has contributed works dealing with muscular mechanics. *E. Landergren* (born 1867) and *E. O. Hultgren* (born 1866) have made experiments on the assimilation of food. In Lund has been working, since 1885, *M. G. Blix* (born 1849), noted principally through his discovery that cold, heat, pressure, etc., are perceived by different sets of nerves, as also through his works on muscle mechanics and the development of muscular heat. The University of Lund has a newly established physiological laboratory.

Medical Chemistry. The most illustrious of its names is *J. J. Berzelius* (1779/1848); to this are attached the following: — in Uppsala, *O. Hammarsten* (born 1841), distinguished through his discovery of the active substance of rennet in the gastric juice of the human body, and through significant works on the albuminous, blood- and digestion chemistry, etc., and also through his Manual of Physiological Chemistry, which has been translated into several foreign languages; further, *A. T. Almén* (1833/1903), and *C. T. Mörner* (born 1864), have been developing biological and pharmaceutical chemistry; — in Stockholm, *K. G. Mosander* (1797/1858), prominent mineral chemist and pharmacist; *N. P. Ham-*

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berg (1815/1903), active in various directions as scientific chemist, toxicologist, and chemist to the medical department; *S. Stenberg* (1824/84), who has dealt with numerous questions of practical chemistry; *N. J. Berlin* (1812/91) and *S. Jolin* (born 1852), who have devoted themselves mostly to pharmaceutical chemistry and to works of pharmacopœia; while *K. A. H. Mörner* (born 1854) has made important observations as regards the chemisty of certain albuminous and mucous substances, as well as of colouring matters found in the human body, etc. *J. Sjöqvist* (born 1863), of Stockholm, and *S. Hedin* (born 1859), of Lund (lately called to be superintendant of a department of the Jenner Institute, London) have, among other things, applied modern physical chemistry to physiological subjects in their investigations. The faculties of Medicine in our country, three in number, are all in possession of chemical laboratories, and the instruction in medical chemistry of Sweden ranks higher than that of most other countries.

The science of drugs (pharmacology), previously cultivated together with natural history and especially botany by *Urban Hjärne* (1641/1724), *Linné* (1707/78), *A. J. Retzius* (1742/1821) in Lund, *G. Wahlenberg* (1780/1851) in Uppsala, *P. F. Wahlberg* (1800/77) in Stockholm, and others, as well as in later times by *O. T. Sandahl* (1829/94) and *R. F. Fristedt* (1832/93), has since the decade beginning 1890, been pursued in the modern direction as an experimental science, at the Caroline Institute by *C. G. Santesson* (born 1862), who among other things has studied the effects of quinine, benzine poisoning, etc.; and in Uppsala by *M. Elfstrand* (born 1859), who has worked with Toxalbumins of Croton seeds, while *H. V. Rosendahl* (born 1855) has made a study of the poisonous effects of Scandinavian Aconite (Aconitum septentrionale), and *K. Hedbom* (born 1859) of the effect of poisons on the isolated heart of mammals. In Uppsala, as well as in Stockholm, preparation is being made for the establishing of pharmacological laboratories.

The **pathological** systems, which were but partly founded upon careful research in the 17th and 18th centuries, as well as in the beginning of the 19th century, had also their representatives within the medical faculty of Sweden, among whom the last one was *Israël Hwasser* (1790/1860). The **pathological-anatomical** school of Paris in the beginning of the century, which has for ever united clinical observation with pathological anatomy, found its first disciples in *A. Retzius* (1796/1860) and *M. Huss* (1807/90), and after the middle of the 19th century special professorships were founded in Uppsala and Stockholm at about the same time. The professors for this subject at Uppsala, Stockholm, and Lund, were respectively *P. Hedenius* (1828/96), *A. Key* (1832/1901), illustrious teacher and scientific author, and *M. V. Odenius* (born 1828). These professors as well as their disciples, among whom may be mentioned *H. Bendz* (born 1851), *U. Quensel* (born 1863), *E. Selander* (born 1846), *C. Sundberg* (born 1859), *A. Vestberg* (born 1859), and *C. Wallis* (born 1845), have worked in pathological anatomy, or bacterio-**etiological** research; in 1895 this last-named science was endowed with its first teacher, when the office of Demonstrator of Bacteriology at the Caroline Institute was filled.

Modern **hygienical** research likewise obtained its first professorship in Sweden in 1878 at the Caroline Institute, the first holder of which was *E. Heyman* (1829/89). Together with him, and in this same field, *E. Almquist* (born 1852), *A. Key*, *K. Linroth* (born 1848), *C. Wallis*, and *R. Wawrinsky* (born 1852) have worked. The extensive studies of A. Key in school-hygiene deserve special notice.

Forensic Medicine and Medical Jurisprudence first had a special professorship devoted to them at the Caroline Institute in 1861, when *A. H. Wistrand* (1819/74) received the appointment as professor pro tempore of this subject. Besides him, *A. Jäderholm* (1837/85) and *A. Key-Aberg* (born 1854) have been the principal workers in this science in our country.

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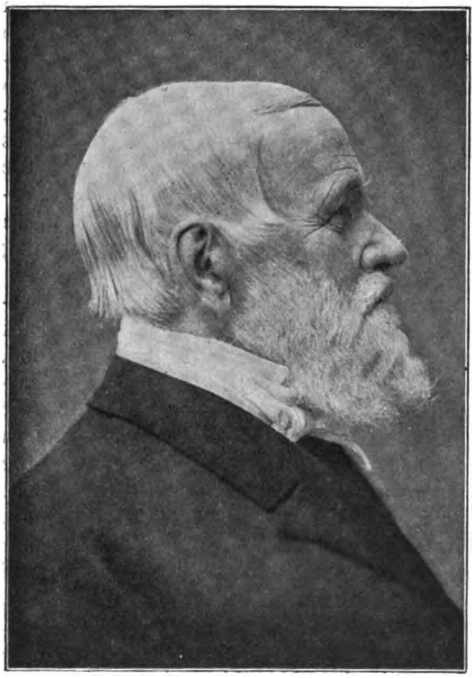
The history of **internal Medicine** in Sweden is closely linked to that of the medical colleges. *P. Hoffvenius* (1630/82) in Uppsala may be designated the founder of this study with us. *O. Rudbeck*, Sen. (1630/1702), worked zealously for the erection of the first Academic hospital in the kingdom, but it did not come into existence until 1717. During the 18th century the medical faculty of Uppsala possessed two brilliant teachers and scientists in *N. Rosén v. Rosenstein* (1706/73), the father of the pediatric, and *K. v. Linné*, who, among other things, affirmed that the maintenance of health depended on good air, sufficient exercise and sleep, suitable diet, etc., and predictively declared in his doctrine of »Exanthemata viva» that contagious diseases such as plague, leprosy, consumption, ague fever etc., are bred in the human system by animalcula, which Linné hoped in time would be discovered. — In Lund the first professorship of practical medicine was held by the German polyhistor *Kr. Rostius* (1620/87). During the 18th century the most brilliant teacher the faculty possessed was *E. Rosén-Rosenblad* (1714/96), highly esteemed both as a physician and a scientist.



Magnus Huss.

Internal medicine dates its renewal from the beginning of the nineteenth century, when the philosophical tendency of thought was thrust aside by scientific, objective investigation. At that time Sweden had two renowned, practical physicians for internal diseases, namely *P. v. Afzelius* (1775/1840), archiater and professor at Uppsala; and the ingenious *E. Zakarias Munck af Rosenschöld* (1775/1840), professor at Lund, who made a name for himself by introducing vaccination and hygienic improvements into the country. In the middle of the century the school of natural philosophy owned, as mentioned above, yet another representative in *Israël Hwasser* (1790/1860), professor at Uppsala, who was much in favour on account of his personality. *Magnus Huss* (1807/90) opened up new fields, and in 1838 he inaugurated at the Seraphim Hospital a department of clinical medicine for internal diseases, answering to the claims of the time. His works on alcoholismus chronicus, inflammation of the lungs, typhoid fever etc., gained him European fame and are of lasting value. *P. H. Malmsten* (1831/83) is known through his works on chronic Bright's disease and through the discovery of diverse disease-breeding parasites. In Uppsala clinical instruction in accordance with the times was introduced by *O. Glas* (1812/80), and likewise in Lund by *P. E. Gellerstedt* (1815/81). In Stockholm *R. Bruzelius* (1832/1902) has worked as a clinical lecturer, and as a scientific author has been treating of laryngo-pathology.

Among the physicians now living, who have contributed considerably to the development of medical training, and of internal medicine, the following may be named. *P. J. Wising* (born 1842) has published his examinations with regard to nerve complaints and internal diseases; *F. W. Warfwinge* (born 1834) is

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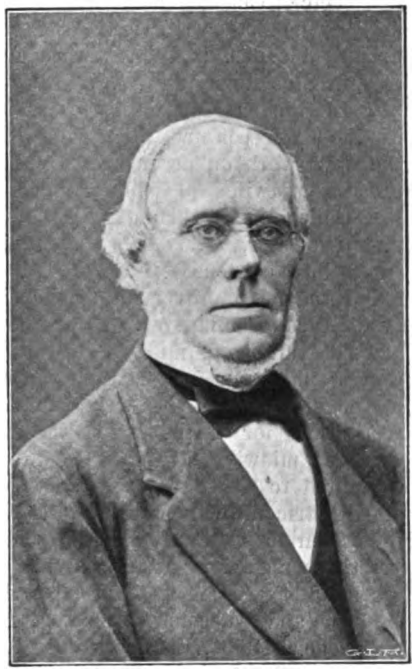
deserving of credit as regards modern care of the sick, and has made investigations concerning fevers and diseases of the blood; *S. E. Henschen* (born 1847), of the Uppsala university, has made important investigations about nervous and especially brain diseases and about the sightcenter in the brain (Pathologie des Gehirns, 4 vols), and has also, among other matters, written about heart diseases. *J. G. Edgren* (born 1849), of Stockholm, has published investigations concerning diseases of the heart and blood-vessels. In Uppsala *O. V. Petersson* (born 1844) has made studies respecting the diagnosis of affections of the heart, albuminuria, and tuberculosis. In Lund *S. Ribbing* (born 1845) works as lecturer on clinical medicine. *T. Hellström* (born 1857) has made investigations on the treatment of diphtheria by serum. *T. Stenbeck* (born 1864) has discovered the sedimentator.

During the latter half of the 19th century several specialties have developed here. Pediatrics, the father of which was *Rosenstein*, was constituted a modern science by *Fr. T. Berg* (1806/87; works concerning thrush, among other subjects), and in his footsteps *Hj. Abelin* (1817/93) and *A. Kjellberg* (1828/84) followed both as teachers and promotors of this science, as also the pediatric still living, *O. Medin* (born 1847), who has treated of infantile paralysis, and *J. Wærn* (1849/1903), who has made investigations concerning diphtheria and croup. Knowledge of venerial diseases has been furthered by works of *E. Ödmansson* (born 1831), lately on syphilis congenita, and *E. Welander* (born 1846), who has made investigations on the absorption of mercury by the human system and its expulsion from it, and has discovered new methods of treatment.



Fredrik Teodor Berg.

The scientific study of mental diseases was founded with us in 1859 by *N. G. Kjellberg* (1827/93), who opened the first psychiatrical clinic at Uppsala. Nervous disorders have been treated by *Fr. Lennmalm* (born 1858), *H. Köster* (born 1858), and several younger specialists. The oldest Swedish mineral wells were analyzed by *Urban Hjärne* (1641/1724). *J. O. Lagberg* (1789/1856) introduced the modern water cure. Balneatory and climatal therapeutics have been advanced practically and scientifically especially by *C. Curman* (born 1833), who has analyzed the climatical conditions and the watering properties of the West coast of Sweden, as also by *A. Levertin* (born 1843). *E. G. Johnson* (born 1852) has applied himself to treatment of stomach disorders, and *O. G. Wetterstrand* (born 1845) to hypnotism.

Surgery was practised in Sweden until the middle of the 18th century as a trade of the so-called barbers and barber-surgeons. At that time the scientific tendency generated by the development of anatomy also thrust itself in upon us, and *Olof af Acrel* (1717/1806), highly deserving both as a theorist and a practitioner, is rightly pronounced the father of surgery in our country. Through the breaking up of the so-called Surgical Society (1797) and the establishment of the Caroline Institute in the capital (1810), the old barriers between physician and surgeon disappeared, and henceforth the Swedish physician is required to

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have both theoretical and practical knowledge of surgery also. The highest credit in having introduced with us systematic instruction in clinical surgery is due to *K. J. Ekströmer* (1793/1860). His work was followed up by the eminent teacher *K. G. Santesson* (1819/86), skilful surgeon and anatomist. Contemporarily with him *K. J. Rossander* (1828/1901) was practising principally as an opthalmologist. — Surgery won its own advocates later in the universities than in the capital. As pioneers in the field of clinical instruction are noted *K. B. Mesterton* (1826/87) at Uppsala, and *K. J. Ask* (1825/97) at Lund. Thanks to the thorough, special training that is now demanded, Sweden possesses a great number of well-schooled surgeons. The literary activity in this branch is also strongly increasing. *K. G. Lennander* (born 1857), of Uppsala, is known as an author within abdominal surgery — the surgical treatment of appendicitis, kidney diseases, etc. Engaged as professors of surgery are *J. Berg* (born 1851) in Stockholm, who has written treatises on surgical therapeutics of the ectopia of the urinary bladder, and on ventricular surgery; further *J. Åkerman* (born 1861), also in Stockholm, and *J. Borelius* (born 1859) in Lund.

In Sweden Midwifery dates its first scientific elevation from the conclusion of the 17th century, principally through *J. von Hoorn* (1662/1724), author of the first work on accouchment published in Swedish, entitled »The Swedish well-trained Midwife» (1697). A special professorship of Obstetrics was founded at the Collegium Medicum in 1761, and through the energetic steps taken by its first professor, *D. von Schulzenheim* (1732/1823), the Public Lying-in Hospital came into existence in 1775. *P. G. Cederschiöld* (1782/1848) actively contributed to the improvement of the obstetrical education and training of physicians as well as of midwives. After the opening of another Public Lying-in Hospital, and the training of midwives having been transferred thither, the obstetrical instruction of physicians was arranged in a most commendable manner under the direction of the distinguished lecturer, Professor *A. Anderson* (1822/92). There are now Institutions for the education and training of midwives in Gothenburg and in Lund. Qualified midwives are permitted to perform instrument accouchments upon being submitted to a special examination. Gynecology was combined with the subject of Obstetric medicine for the first time in Sweden on the nomination of Professor Andersson in 1864. Since that time surgical gynecology has had a great many able practitioners, among whom may be mentioned *S. Sköldberg* (1838/72), *W. Netzel* (born 1834), *K. G. Lennander*, and others. As professors and docents of Obstetric medicine and gynecology are at present engaged: *M. Salin* (born 1851), *F. Westermark* (born 1853), and *C. D. Josephson* (born 1858), at Stockholm; *A. O. Lindfors* (born 1852), at Uppsala; and *G. E. Essen-Möller* (born 1870), at Lund.

The scientific study of Ophthalmic Medicine in our country dates from the time of *K. Fr. Ribe* (1708/64). That flourishing ophthalmology displayed in the latter part of the 18th century was followed by a decline of 50 years. Its revival may be reckoned from the time when, in 1857, *K. J. Rossander* of Stockholm, and, in 1868, *M. K. Löwegren* (born 1836) of Lund, resumed systematic instruction on this subject. *J. Widmark* (born 1850) is known through his studies concerning the influence of the light on the eye. *A. Gullstrand* (born 1862) has examined the laws of the refraction of the eye, and *E. Nordenson* (born 1847) has studied the amotion of the retina. — Active as teacher in the diseases of the ear, nose, and larynx is *A. Stangenberg* (born 1860) at Stockholm.

The principal medical **periodicals** in Sweden are »Nordiskt medicinskt arkiv», being an organ of medicine common to the Scandinavian countries, founded by Axel Key in 1869, and now issued in foreign languages; moreover, there are in Swedish the Transactions of the Uppsala Association of Physicians, and the Hygiea, this latter published by the Swedish Society of Physicians, which was founded in 1808.

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Physical Anthropology.

To the furtherance of those researches whose object is to disentangle the complicated question about the physical characteristics of the human races with their mutual relations and origin, Swedish investigators have contributed in an effectual manner. In his Systema Naturæ, *Linné* (1707/78) set up five different human races, classified — chiefly according to the colour of the skin and to the boundaries of the different parts of the world — into: Americans, Europeans, Asiatics, Africans, and a »monstrous» race besides. Instead of this last one, Blumenbach, the German, added the Australians as a fifth race and called these five kinds »varieties», founding his classification also on the shape of the cranium.

By the exploratory researches of *Anders Retzius* (1796/1860) on the shape of Scandinavian skulls (1842), modern anthropology was founded. He proved that within the different varieties there are separate, typical forms of craniums. First he examined the nations of Europe, then also those in other parts of the world, cleared up the question on the shape of their skulls, and thus, in fact, gave rise to this sort of investigation. His classification of the cranium shapes, according to the relation between their length and breadth (the index cephalicus of Retzius), into dolichocephalous and brachycephalous, has since been universally accepted. *Sven Nilsson* (1787/1883), in his researches on the aborigines of Scandinavia, tried to find out the cranium shape of the people living during the stone and bronze ages, but the material at his disposal was too insignificant to produce any certain results. By the examination of ancient graves from the stone, bronze, and iron ages — carried out during the latter half of last century by *N. G. Bruzelius* (1826/1901), *B. E. Hildebrand* (1806/84), *G. von Düben* (1822/92), *G. Retzius* (born 1842), *O. Montelius* (born 1843), *H. Hildebrand* (born 1842), a. o. — a rather minute knowledge has been gained about the cranium shape of the ancient Scandinavians, and in »Crania svecica antiqua» (1899/1900) G. Retzius has laid down an extensive account of the subject. Also *E. Clason* (born 1829) has contributed to the knowledge about the cranium shape of the Swedes. The length of body of Swedes of the present time has been examined into by *V. Hultkrantz* (born 1862) in making use of a material (comprising above 232,000 individuals), collected during 1887/94 by the military authorities. During 1897 and 1898, on the incitement of the Swedish Anthropological and Geographical Society, a careful examination was carried out on the whole militia of Sweden (altogether about 45,000 men) of the size of body (length of body in standing and sitting position, as well as arm-width) and of the length and width of the head, as well as the shape of the face, and moreover, of the colour of the eyes and hair. This material is being worked out by G. Retzius and Carl M. Fürst (see page 134 and map page 135). By these means, the Swedish people has become one amongst the best known in anthropological respect. Only in Italy and Baden (partly also in Norway) have equally extensive researches been undertaken.

Botany.

Botanical studies were first pursued, in Sweden as elsewhere, for practical purposes, but towards the close of the 16th century scientific interest in the subject began to manifest itself. As the earliest writers on the subject in Sweden *J. Chesnecopherus* (1581/1635) and *J. Franck* (1590/1661) deserve to be mentioned; their works, however, display industrious study of the writings of foreigners rather than results of independent research and observation. It is not until

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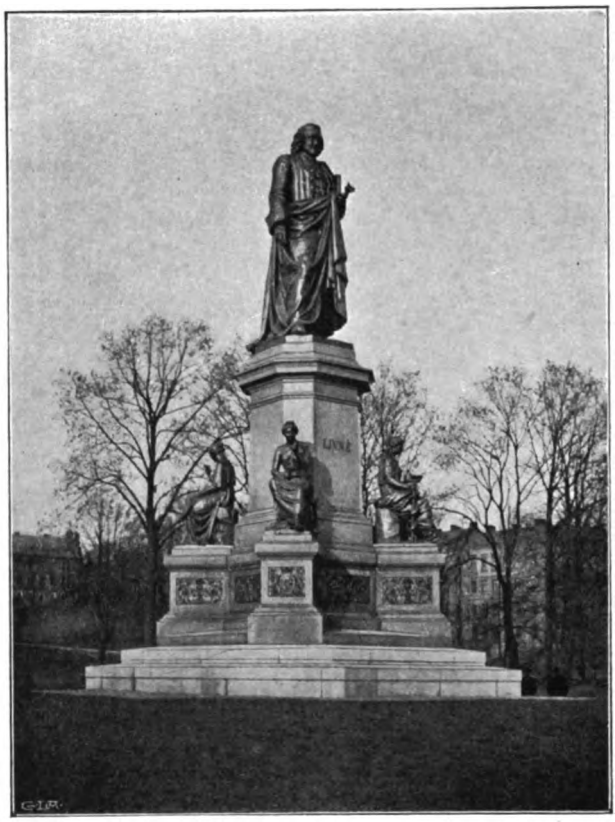

Statue of Linnæus, Stockholm.

the latter half of the 17th century that botany can be said to have attained to an independent position as a subject of scientific study and investigation in Sweden; that period saw the production of a great work by *Olof Rudbeck* the Elder (1630/1702) and *Olof Rudbeck* the Younger (1660/1740), entitled Campi Elysei and containing illustrations — for that period eminently good ones — of about 6,000 species.

During the following century, botany attained to the foremost place among the branches of natural science studied in Sweden, owing to the work of the greatest of Swedish natural scientists, *Carolus Linnæus* (ennobled *von Linné*), who was born at Råshult in Småland, May 13, 1707. After having taken his M. D. degree in Holland, he practised medicine in Stockholm for a few years, and, in 1741, was summoned to Uppsala as a professor, a position he continued to hold until his death Jan. 10, 1778. Linnæus' services to botanical science cannot be overrated. The existing literature on the subject was carefully examined by him, further to develop all that was found of value. The description of animals and plants was by him heightened into a real art, both by establishing a normal form of diagnosis for the characterization of different species in succinct but in their signification accurately defined terms, and by introducing the binary nomenclature, i. e. the method of naming animals and plants both by one specific and one generic name. His sexual system enabled him to give a very necessary survey of the species then known; he made clear the difference between artificial and natural systems, and showed how a natural system should be arrived at; he also distinguished and gave names to 67 natural families. His chief works on systems are his Systema Naturæ and his Species Plantarum. In his work entitled Philosophia Botanica he reproduces what was at that time known concerning the external and internal structure of plants; the same work contains manifold biological observations and an account of his views regarding phytography and the system of plants. In his natural science work Linnæus showed himself to be rather an arranger and systematizer than a discoverer; it has, indeed, sometimes been urged against him that he neglected other phases of botany, such as phytotomy and vegetable physiology. It should, however, be remembered that Linnæus effected just what was most urgently needed *at that time* in the domain of natural history investigation.

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The work done by Linnæus exercised an extraordinary influence on the study of botany in Sweden. Thanks to him, botany became a »scientia amabilis» for the Swedish people, and he determined the main course of development for botanical research in Sweden for the next hundred years. The numerous pupils whom his example and instruction inspired with enthusiasm for the scientific study of botany, wandered far and wide to a large number of countries at that time unexplored, searching into their vegetable world. Among the pupils of Linnæus the following deserve special mention: *P. Löfling* (1729/56), who visited Spain, *P. Kalm* (1716/79), who carried on investigations in North America, *F. Hasselqvist* (1722/52), who made researches in Asia Minor, Palestine, Arabia, and Egypt, and finally *P. Forskål* (1732/63), celebrated for his travels in Egypt and Arabia. The most eminent, however, of all these explorers of natural science was *K. P. Thunberg* (1743/1828), who attained a world-wide celebrity by his travels in South Africa and Japan, the floras of which countries he described.

E. Acharius (1757/1819) turned his attention to the study of lichens, and is regarded as the founder of descriptive lichenology. *O. Swartz* (1760/1818), after extensive travels in North America and the West Indies, published a number of very meritorious works, of which those dealing with orchids, ferns, and mosses are of the greatest importance. These two scientists were not actual pupils of Linnæus, but they were in complete unison with his scientific views; the Linnæan epoch in a strict sense may be said to close with them.

At the commencement of the nineteenth century botanists who may be said to inaugurate a new era — lasting till about 1850 — made their appearance on the scene. *G. Wahlenberg* (1780/1851), one of the most original among Swedish botanists since Linnæus, was the most independent of this new school. His special field of investigation was alpine vegetation, in Lappland, Switzerland, and the Carpathians. By dividing up Scandinavia for the purposes of his investigations into a number of districts, and by showing how the characteristics of the vegetation in these differ in accordance with the climatic conditions, he introduced new, and very important, points of view for the study of the vegetation of a country. With Humboldt he shares the honour of being the founder of botanical geography as a science, his work »Flora Lapponica» being epoch-making in that department. Unfortunately Wahlenberg did not establish any school of botanists, so that phytogeographical work in Sweden languished after his death, not to be revived until the latter part of the century.

Fresh developments were made in the systematics of the Phanerogamica; here *Elias Fries* (1794/1878) was preeminent and succeeded in collecting around him numbers of pupils. The several species were subjected to a more thorough examination than Linnæus had been able to effect; many of them were subdivided into several differing species, whereby the conception of *species* has been considerably extended in scope. Elias Fries also drew up a natural system, embracing much that has been adopted by later writers. In his studies of species he was followed by a number of pupils, amongst others *Th. M. Fries* (born 1832) and *K. J. Lindeberg* (1815/1900). He also exercised a wide-spread influence through the medium of *K. J. Hartman* (1790/1849), who published a Scandinavian Flora in 1820, which has run through no less than eleven editions and greatly contributed towards spreading an interest in botany throughout the country.

Another branch of botanical science that in Sweden came to the front about the same time was the investigation of cryptogams, Sweden possessing at this time two authorities in that department, viz., *K. A. Agardh* (1785/1859), who studied algæ more especially, and *Elias Fries*, who was one of the founders of mycology, contributing to the subject numerous works, of which Systema Mycologicum deserves to be noted in particular. Thanks to the two men just named, a lively interest in the study of cryptogams arose among Swedish botanists, that has survived down to

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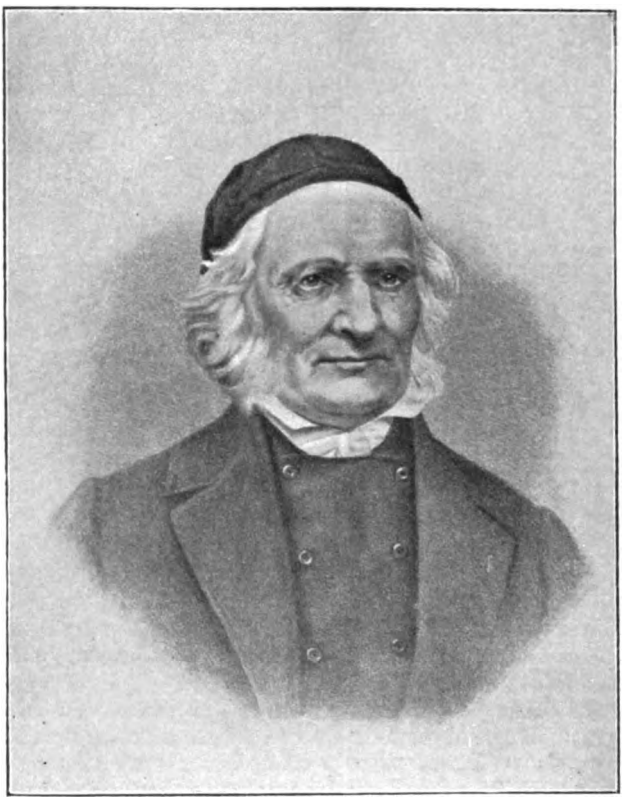
the present day — a state of things which can be proved by the fact that practically all the botanists who hold official appointments in the country are specialists in one group or another of cryptogams. The microscope came to be used increasingly in this study, both in differentiating the different species and in investigating their internal structure. Owing to this increased accuracy of method, the investigation of cryptogams in Sweden has been able to record among its results, not only the discovery of a number of new species, but also important observations upon the structure and propagation of lower vegetable forms.



Elias Fries.

Algology was the branch that attracted the majority of students; among them the following deserve mention: *J. G. Agardh* (1813/1901), who published a number of important works, thereby establishing his reputation as one of the foremost algologists of the period; *J. E. Areschoug* (1811/87), who made important discoveries as to the structure and mode of propagation of numerous families of algæ; *F. R. Kjellman* (born 1846), a pupil of the lastnamed, who has investigated the flora of the algæ in the Arctic seas and introduced the formation idea in the study of the algal regions in the ocean; *V. B. Wittrock* (born 1839), an eminent investigator of the systematics of several large genera of algæ, and *O. Nordstedt* (born 1838), acknowledged as the greatest living authority on the desmids; finally, *G. Lagerheim* (born 1860), who has published numerous papers on the structure and development of the lower algæ. Descriptive lichenology has found an excellent exponent in *Th. M. Fries*, while mycology has been taken up again from new points of view by *J. Eriksson* (born 1848) and *E. Henning* (born 1857), who have devoted special study to rustfungi, by *G. Lagerheim*, the author of some well-known monographs on certain genera of fungi that are of interest in systematic regard, and by *O. Juel* (born 1863), who histologically has examined several different genera. *S. Berggren* (born 1837), *S. O. Lindberg* (1835/89), and others have devoted special attention to the study of mosses. The former took up the flora of the mosses of the Arctic regions in particular, the latter, by a number of treatises displaying great acumen, has effected reforms in the systematics of mosses.

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The alteration in the conception of »species» produced by the evolution theory as enunciated by Darwin, infused new life into systematics and assigned it new tasks. In order the better to be able to study evolution, attention was turned to multiform plant-genera or to those undergoing a process of evolution, and extensive research has been made by Swedish botanists into such genera as Rubus, Rumex, Viola, Hieracium, etc. During the last ten years a new direction has been given to this branch of study, and the results of it promise well for the solution of modern problems of systematics; one of the chief representatives of this — the geographical-morphological — method is to be found in Sweden in the person of *S. Murbeck* (born 1859).

Botanical geography, which had been in abeyance since the death of Wahlenberg, was re-established on a fresh basis, the evolutionary-historical, in 1870, at the discovery by *A. G. Nathorst* (born 1850) of a glacial flora of dwarf birches, polar osiers, Dryas, etc., in the fresh-water clays of Skåne. That new departure has been followed up since then, both by Nathorst himself and by other investigators, for instance *Gunnar Andersson* (born 1865), *R. Sernander* (born 1866), a. o. By studying plant-remains in clays, sand-deposits in rivers, peat-mosses, and impressions of leaves in limestone tufas, scientists have been able to trace the successive invasion of a large number of plant varieties, and by collating botanical observations with the results of the geologists' researches into the geographical history of Scandinavia in the Quaternary Period, they have been able to establish the fact that the evolution of vegetation in the peninsula since the Glacial Epoch is to its chief features understood and known. This is a proud result, the like of which is not to be found in any other country.

During the latter half of the 19th century botanical research has, moreover, extended beyond the borders of Sweden itself. In almost all the numerous **Arctic** expeditions despatched from Sweden since 1837, there have been botanists on board, who have not only studied the vegetation, but also the biology of the places and waters visited. Among others who have distinguished themselves in that department may be mentioned: *Th. M. Fries*, *S. Berggren*, *A. G. Nathorst*, and *F. R. Kjellman;* the last-named more especially has made highly important observations relative to the conditions of plant-life during the Arctic night and at low temperature. Owing to the liberality of a Swedish medical man, *A. F. Regnell* (1807/84), it has been possible for Swedish botanists to study tropical flora, more especially that of South Brazil. Among those who have enjoyed the benefit of Regnell's munificence number *C. A. M. Lindman* (born 1856) and *G. Ason Malme* (born 1864).

As the above account shows, Swedish botanists have, in the main, devoted attention to special botany, the reason of that being traceable to the influence of Linnæus. During the last thirty years a change in that regard has taken place, inasmuch as the field has been widened, to include vegetable anatomy, morphology and physiology, each of which has had its special exponents. *K. A. Agardh*, it is true, carried out anatomical and morphological researches, but his interpretation of the observations he had made was obscured by the speculations in natural philosophy in which he indulged. The first anatomist Sweden has produced is *F. W. C. Areschoug* (born 1830), whose work has been directed towards showing the connection existing between the structure of plants and the external conditions bearing upon vegetation as a whole. Of his numerous followers it must suffice to mention *B. Jönsson* (born 1849). Anatomical-physiological study in the domain of botany has been carried on during the last few decades at the Universities in Lund and Uppsala and at the Private University of Stockholm. Morphological research has been pursued by *F. W. C. Areschoug*, and quite recently physiology is being represented by specialists, particularly in Lund, by *B. Jöns-*

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son and *B. Lidforss* (born 1868). *S. Axell* (1843/92) won a reputation as a specialist, in the biology of flowers, and *A. N. Lundström* (born 1847) is celebrated for his investigations upon vegetable and animal symbios.

The instruction given in natural history at the colleges is an important factor in the widespread interest in the subject prevailing among the people of Sweden as a whole. There are probably few countries where so much importance is attached to the teaching of botany and zoology at schools as is the case in Sweden.

A botanical review, entitled »Botaniska Notiser» (Botanical Notes), has been published, with but few breaks, ever since 1839, as the organ of the science in Sweden.

Zoology.

Among Swedish natural scientists, *Olof Rudbeck*, the Elder (1630/1702), was the first to take up independent study of any importance in the domain of zoology. The most important result of his works in this department was the discovery of the lymphatic ducts. He was the first, too, to establish an anatomical and zoological museum in Sweden, and his son, *Olof Rudbeck*, the Younger (1660/1740), like his father a professor at Uppsala University, may be said to be the founder of the Swedish school of zoologists, properly so called. *Linnæus* (1707/78) was an innovator in zoology as in botany. His reform of the nomenclature was, more especially, of the greatest importance for future development of the science. From a zoological point of view, his »Systema Naturæ» is the most important of his many works, though his »Fauna Suecica» and his accounts of his travels in different parts of Sweden are of great value in zoological regard. — Foremost among contemporary Swedish zoologists stood the eminent ichtyologist *P. Artedi* (1705/35), and the renowned entomologist *K. De Geer* (1720/78).

Linnæus having given a systematic survey of the animal kingdom, his immediate successors were in the first place busy in fitting into their places the various animal species found on our planet. Numbers of new animal forms were described, and travels were undertaken even to the most remote parts of the globe, for the purpose of collecting specimens. This branch of zoology usurped attention almost exclusively for some time to come, in Linnæus' native land. *P. Forskål* (1732/63), *K. P. Thunberg* (1743/1828), and *A. J. Retzius* (1742/1821) may be mentioned among the large number of direct followers of Linnæus. Retzius was professor at Lund, and owing to his work, together with that of several other distinguished zoologists resident there, the University of Lund was for a period the chief seat of zoological research in the country. *Sven Nilsson* (1787/1883) was the most celebrated of those investigators; he had a very great influence upon the development of zoological study in the country, principally by his works upon Scandinavian Fauna. He also carried out very important researches in the domains of paleontology and archeology. Of other zoologists of earlier days, attached to the University of Lund, the following may be specially mentioned: *J. W. Zetterstedt* (1785/1874) and *K. G. Thomson* (1824/99), entomologists, and *O. M. Torell* (1828/1900), who, however, devoted himself principally to geology.

An event of great consequence in the history of zoological science in Sweden was the founding, in 1820, of the National Museum of Natural History in Stockholm. The first heads of the zoological department of that institution were *J. V. Dalman* (1787/1828), an entomologist, and *B. Fries* (1799/1839), an ichthyologist. The zoological collections soon increased at such a pace that the staff of keepers had to be strengthened. *K. J. Sundevall* (1801/75) was appointed curator

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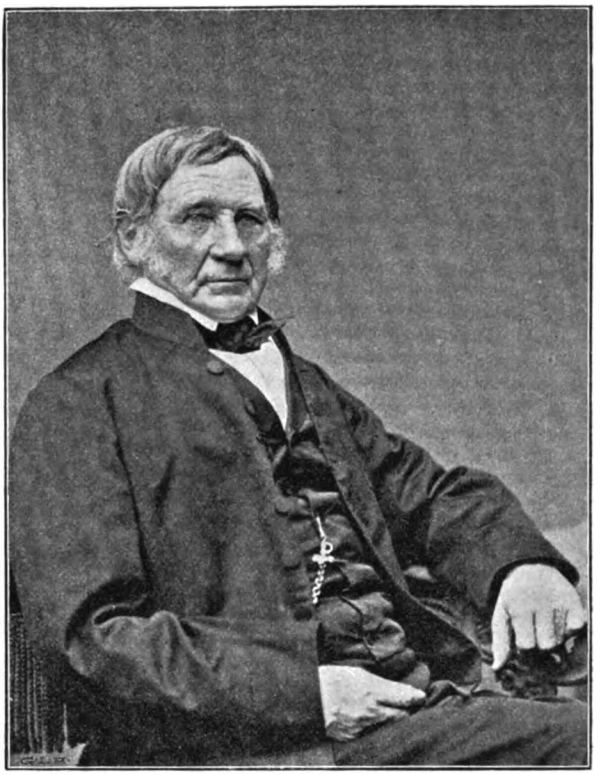
of the collection of vertebrates, *K. H. Boheman* (1796/1868), and in succession to him *K. Stål* (1833/78), and *Chr. Aurivillius* (born 1853; since 1901 Secretary of the Swedish Academy of Sciences), curators of the entomological collections, *S. Lovén* (1809/95), of the collections of other invertebrates, *N. P. Angelin* (1805/76) and in succession to him *G. Lindström* (1829/1901), of the collections of fossil animals. Among the above-mentioned scientists, all distinguished investigators in their several departments, *Lovén*, in particular, occupies a place in the front rank. His short but excellent studies on embryology resulted in the introduction of this branch of science, up to that time not cultivated in Sweden. Later on, he made an extensive and fruitful study of echinidæ. His voyage to Spitzbergen in 1837 may be said to have inaugurated the long series of Swedish Arctic expeditions for purposes of scientific exploration. Moreover, he was a pioneer in deep-sea research. Basing his theory upon the presence of Arctic animal forms in the Baltic Sea and certain Swedish lakes, he propounded the statement that those waters had formerly constituted a portion of the Arctic Sea; this theory has since been confirmed by geologists. The present heads of the various sections of the National Natural History Museum are: *F. A. Smitt* (born 1839), who has made fishes his principal study, *G. Holm* (born 1853), a paleontologist, *Y. Sjöstedt* (born 1866) an entomologist and *Hj. Théel* (born 1848), who has devoted himself chiefly to research upon the anatomy and embryology of the invertebrates.



Sven Nilsson.

Subsequent to the death of Thunberg, zoological study at Uppsala was neglected almost entirely, but a chair in the subject was established in 1852. The first professor was *W. Lilljeborg* (born 1816). His works deal primarily with Scandinavian fauna, especially the vertebrates and crustaceans. Zoological research received an immense impulse at Uppsala under Lilljeborg's guidance. He retired from the professorship in 1882, and was succeeded by *T. Tullberg* (born 1842), who has taken up different branches of comparative anatomy as his specialty. For a short period, *T. Thorell* (1830/1901) was also attached to the University of Uppsala in a teaching capacity. His researches were chiefly directed upon arachnida.

A zootomical laboratory was established at Uppsala in 1876, the first in Sweden. The example set was shortly afterwards followed at Lund. In connection with these institutions, an associate professorship in comparative anatomy was

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founded later at each of these universities. The present holders of those chairs are: *A. Wirén* (born 1860) at Uppsala, and *D. Bergendal* (born 1855) at Lund; they have both published works on the anatomy of invertebrates. In 1884, a chair in zoology was founded at the Private University of Stockholm, at present held by *W. Læche* (born 1850). He was instrumental in establishing a zootomical institute in Stockholm too. His chief study has been the anatomy of mammalia. — Almost contemporaneously with these zootomical laboratories, a zoological marine station was established at Kristineberg in Bohuslän, at the suggestion of Lovén. The fact of these institutions being established shows in itself that fresh aspects of zoological science were being vigorously studied at the time in Sweden.

Of Swedish zoologists of the past, yet a few more may be named here: *L. Gyllenhaal* (1752/1840), *K. J. Schönherr* (1772/1848), and *N. Westring* (1797/1882), entomologists; *A. Retzius* (1796/1860), the celebrated anatomist and ethnographer, and *K. V. S. Aurivillius* (1854/99), who made marine animal life his chief study. Among Swedish zoologists now living, we may further mention the following: *G. Retzius* (born 1842; emeritus professor of anatomy), celebrated for his studies on the auditory organs of vertebrates besides other anatomical works; *A. W. Quennerstedt* (born 1837; emeritus professor of zoology at the University of Lund), *C. A. Westerlund* (born 1831), *P. Olsson* (born 1838), *S. Lampa* (born 1839), *C. O. v. Porat* (born 1843), *G. Kolthoff* (born 1845), *G. Adlerz* (born 1858), *S. Bengtsson* (born 1860), *H. Wallengren* (born 1864), *E. Lönnberg* (born 1865), *O. Carlgren* (born 1865) and *L. A. Jägerskiöld* (born 1867). Finally may be added two Swedish zoologists holding appointments at scientific institutions abroad, viz., *G. Eisen* (born 1849), curator at the Californian Academy of Sciences in San Francisco, and *A. Appellöf* (born 1857), curator at the Museum of Bergen in Norway.

Geology and Mineralogy.

Sweden already at an early period occupied a prominent position in the domain of geological research. *U. Hjärne* (1641/1724) expressed the views afterwards further developed by many other savants, that the strata of the terrestrial globe were originally deposited in water, that the fossils are remains of formerly living creatures, and that the earth undergoes various changes. After Hjärne appeared *E. Svedenborg* (1688/1772), *M. v. Bromell* (1679/1731), *K. Stobæus* (1690/1742), and *A. Celsius* (1701/44) with — considering the time at which they were written — very noteworthy treatises on geological, mineralogical, and paleontological questions, the last-named on the decrease of water in the Baltic and the Atlantic.

Karl v. Linné (1707/78) — better known to Englishmen by the latinized form of his name, Linnæus — with his keen faculties of observation, interpreted wonderfully correctly the heterogeneous geological matters that he had observed in several provinces of Sweden, e. g. he constructed a section of Kinnekulle, a mountain built of horizontal Cambrian and Silurian strata, which section in its main features is accepted at the present day, and he compared the succession of strata there with that in other districts. Through Linnæus having assumed a fixed sequence of strata over the whole earth, and that the strata were formed in the sea, he has really laid the foundation of the system of classification advanced by the German geologist and mineralogist Werner in 1780, who grouped the rocks of the earth's crust according to the order of succession in which they were assumed to be deposited by water, a system which is only a further development of the views of Linnæus. — With regard to minerals, Linnæus understood the importance of the geometrical character of crystals for their systematic classification, and this method of his was followed by *J. G. Wallerius* (1709/85), who published the first real handbook in mineralogy, a work which is regarded

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as being incomparably superior to anything written up to that time in this branch of science since the days of Agricola. *A. F. Cronstedt* (1722/65) carried mineralogical knowledge a gigantic stride further by his excellent work, »Försök till en mineralogi, eller mineralrikets uppställning» (Essay on a System of Mineralogy or the Classification of the mineral kingdom), which has been translated into several foreign languages.

In 1766, *T. Bergman* (1735/84) published his famous work, »Physisk beskrifning öfver jordklotet» (Physical description of the Globe), which can be said, in a still higher degree than the works of Linnæus, to be a fore-runner of Werner's system. The work in question contains many important statements regarding the formation and classification of the strata of the earth, their changes and dislocations etc., statements which bear witness to an unusually clear understanding of geological phenomena. Among other things Bergman pointed out that the sediment deposited on the bottom of the sea must contribute to the raising of the surface of the water, a view that in later times has been further developed and employed to explain the rising of the sea-level. — *D. Tilas* (1712/72), *S. G. Hermelin* (1744/1820), and *V. Hisinger* (1766/1852) have also made themselves famous in the field of geological research, the two latter especially through their geological maps. It may be truly said that, already during the 18th century, the geological scientists of Sweden proceeded on their own course of investigation as peers of their contemporaries in other countries, and, in many cases, even in advance of them.

In the beginning of the nineteenth century, *N. G. Sefström* (1787/1845) aroused attention by his observations on the grooves and striæ inscribed in the mountains and their regular direction. About this time paleontology began to flourish in Sweden, mainly through *V. Hisinger*, *G. Wahlenberg* (1780/1851), *V. Dalman* (1787/1828), and *S. Nilsson* (1787/1883), and still more through *N. P. Angelin* (1805/76), who classified the Swedish silurian strata according to the fossil animals found in them. The following were also remarkable as paleontologists: *G. Linnarsson* (1841/81), *B. Lundgren* (1843/97), and *S. A. Tullberg* (1852/86). In the departments of mineralogy, petrography and geology of mines, *A. Erdmann* (1814/69) and *A. Sjögren* (1822/93) were at their time very energetic.

Axel Erdmann.

During the last decades, geology as well as paleontology have made uninterrupted progress; the silurian, rhætliassic, and cretaceous series of strata, and their fossil animal and vegetable remains are studied and described, the quaternary deposits are investigated with daily increasing interest and success, so that Sweden, in these branches of geology, has in many respects led the way for foreign scientists; moreover, the volcanic rocks are examined as to their microscopic characters, the mysterious primitive rocks and the complicated building of the highland-regions are the objects of research; at the Swedish universities geo-

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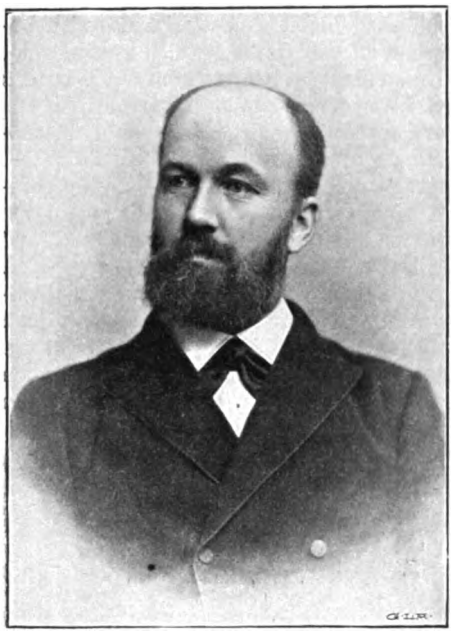
logy has received an important and secure position; in a word, the present time displays a life and interest in geology, mineralogy, and paleontology to which no previous period can show anything corresponding. In all these departments. present-day Sweden possesses men of science who have gained world-wide fame through their successful researches.



Alfred Gabriel Nathorst.

A further impulse in this direction was given by the foundation of »the Geological Survey of Sweden» (1858), a State institution by which a detailed geological examination and mapping of the whole country is carried on. *A. Erdmann* was the organizer and first director of this institution. He was succeeded by *O. Torell* (1828/1900), and, since 1897, *A. E. Törnebohm* (born 1838) holds that office. On the geological sheet-maps published by the Swedish geological Survey (on a scale of 1 to 50,000 and 1 to 200,000) the occurrence and extension of the quaternary deposits as well as the appearance above the ground of the rocks are illustrated. More than 120,000 sq. kilom. in Central and Southern Sweden are in this way mapped, and besides a general map of Sweden (on a scale of 1 to 1,500,000) and several maps of isolated provinces are published.

The Geological Society in Stockholm (1871), and the publication of the Journal of this Society have, of course, contributed in a high degree to promote an interest in geology; so has the paper (Bulletin of the Geological Institution) which in 1892 began to be published in Uppsala.

The researches of Swedes in the Polar districts have proved of great importance, especially for the knowledge of the Glacial Period in Scandinavia. *S. Lovén* (1809/95) was the first to visit Spitzbergen for scientific purposes, viz., 1837. when he made the important discovery of Jurassic fossils in the strata of this island. *Torell*, the precursor in Glacial geology, *A. E. Nordenskiöld* (1832 1901), the famous mineralogist, and *A. G. Nathorst* (born 1850), the celebrated connoisseur of fossil plants, have since arranged and led a large number of geologically important expeditions to the regions of the Arctic Ocean.

Among other Swedish explorers in the above mentioned branches of science may be mentioned: *A. Hamberg* (born 1863), and *Hj. Sjögren* (born 1856). as mineralogists; *Törnebohm*, who has devoted himself to exploring the Archæan and Algonkian districts of Sweden and to petrographical researches; *A. G. Högbom* (born 1857) and *H. Bäckström* (born 1865), of whom the latter has chiefly devoted himself to the study of petrology; *E. Erdmann* (born 1840), who investigated the coal-bearing formation in Skåne; *G. Lindström* (1829/1901), *G. Holm* (born 1853), *J. Ch. Moberg* (born 1854), and *L. Törnqvist* (born 1840). who have specialized in paleontology. In the branch of quaternary geology, the most noticed are: *H. v. Post* (born 1822) and *A. Erdmann*, and, in later times, *G. De Geer* (born 1858), and *H. Munthe* (born 1860).

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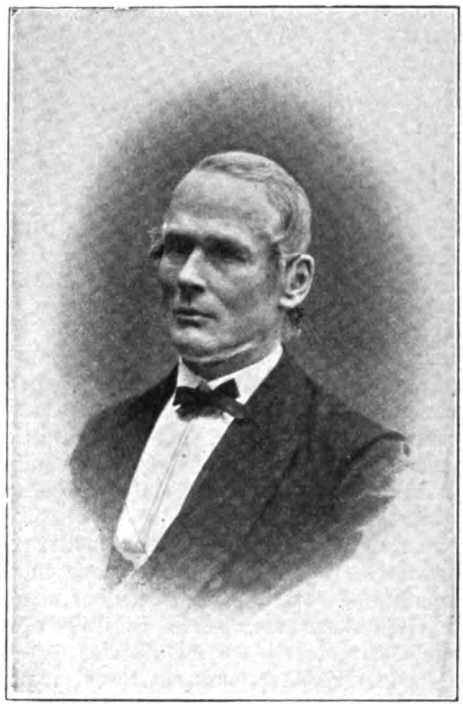
Physics.

It was comparatively late that Physics was admitted as an independent science in the Swedish university curriculum, inasmuch as still in the beginning of the eighteenth century it was always attached to some other subject, usually to mathematics. The first strong impetus to independent physical research in Sweden was received in connection with the universal revival of learning in the middle of the eighteenth century.

Anders Celsius (1701/44) was above all an astronomer, but devoted himself also to physical research. He made photometrical observations, he studied the aurora borealis, terrestrial magnetism, the alteration in gravity according to latitude, etc. His name is connected with the centigrade thermometer-scale, which, however, he first adjusted in such a manner that the boiling-point of water was fixed at zero, and the melting-point of ice at 100 degrees. Linnæus was the first to determine the present form of the scale. — *S. Klingenstierna* (1698/1765), a famous mathematician and optician, was the first professor of physics at the University of Uppsala (1755), where he exercised great influence as a teacher. The most celebrated of his pupils was *J. K. Wilcke* (1732/96), a very notable experimentalist in the domain of electricity. Among his works may be specially mentioned his observations on the variations in terrestrial magnetism (whereby he also corroborated the observations of Celsius on the influence of the aurora borealis on the magnetic needle), and also his notable studies on calorimetry, the main principles of which were indepedently discovered by him. — *G. G. Hällström* (1775/1844; professor at Åbo) is known by his valuable researches on the expansion of bodies by heat.



Anders Jonas Ångström.

With the nineteenth century, physical science also in Sweden enters its flourishing period. *F. Rudberg* (1800/39) won fame by a series of important experimental researches. Among these, special mention may be made of his researches in crystal-optics, his improvements in the construction and testing of the thermometer, his discovery of double melting-points in certain metallic alloys, and his researches regarding the expansion of gases, especially his determining the coefficient of the expansion of air. — *A. F. Svanberg* (1806/57) has among other things investigated the thermo-electrical power in bismuth and antimony crystals, and also constructed and described several apparatus of great ingenuity, viz. an electric duplicator, the precursor, in principle, of Holtz' machine, and a galvanic differential thermometer, which differs only in technical details from the now commonly used bolometer, constructed by the American Langley for investigating radiating heat.

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Svante Arrhenius.

A. J. Ångström (1814/74) was one of Uppsala's most celebrated physicists. Already in 1853 he established some of the principles of the spectrum analysis. In accentuating that »a radiant body emits exactly the kinds of light it absorbs at ordinary temperature», he became one of the foremost founders of the spectrum analysis. Among his other optical works may be mentioned his atlas of the solar spectrum, which was for a long time the norm for all determinations of wave-lengths, his crystal-optical researches, and those on the spectrum of the aurora borealis. Moreover, by a particularly ingenious method, he made determinations on the absolute conductivity of heat of several bodies. — Another of Sweden's most eminent physicists was *E. Edlund* (1819/88), who worked out a new theory to explain the electrical phenomena, supposing, like Franklin, but *one* electric fluid, which he identified with the ether of light. He tried to explain the electrodynamic phenomena by the current of ether. Amongst his numerous experimental investigations may be particularly mentioned his works on extra currents; on the heating effects of induction currents; on the so-called unipolar induction, by which he tried to explain the aurora borealis and the atmospheric electricity; on phenomena connected with the discharge in rarefied gases, which, in accordance with his theory, led him to suppose a vacuum to be a good conductor of electricity. Further, he discovered the electro-motive force in the electric arc; he investigated the development of heat by compression of metals, and tried by the stretching of wire to determine the mechanical equivalent of heat; he studied also the formation of ice in the sea.

Among other eminent Swedish physicists of the past, may be mentioned *F. Wrede* (1802/93), who directed his attention chiefly to optics; *P. A. Siljeström* (1815/92), who carried on a series of experiments with regard to the validity of Boyle's law at low pressures, and *John Ericsson* (1803/89), of whose remarkable discoveries and studies may here be noticed his experiments on radiating heat and his invention of the calorific and the sun machine. The great chemist *J. Berzelius* (1779/1848) exercised also a great influence on physics, more especially through his masterly »Annuals», which were published by the Academy of Sciences in Stockholm during the period of 1821/47, and which also gave account of the results of contemporary scientific researches in physics.

One of the oldest Swedish physicists now living is *T. R. Thalén* (born 1827), formerly professor at Uppsala. He has carried on experiments of great delicacy regarding spectrum analysis, and was the assistant of Ångström at many of his labours in the same field. Magnetism is also the subject of many works of Thalén; thus he has given, among other things, important contributions to our knowledge of terrestrial magnetic conditions in Sweden, and also methods of investigating mining fields.

Among other physicists now living may be named: *A. V. Bäcklund* (born 1845, professor at Lund), who has published important works on mathematical

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physics, especially on the theory of electricity; *K. B. Hasselberg* (born 1848; professor at the Academy of Sciences, Stockholm), who has published careful works on spectrum analysis; *K. Ångström* (born 1857; professor at Uppsala), who, among other things, has published works on radiant heat and on the ultra red spectrum; *S. Arrhenius* (born 1859; professor at the Private University of Stockholm), who has published numerous works on physical chemistry and particularly developed the theory of electrolytical dissociation; his discoveries were in 1903 coronated with one of the great Nobel prizes, that in chemistry; *K. A. V. Holmgren* (born 1824; formerly professor at Lund); *G. Lundqvist* (born 1841; professor of Mechanics at Uppsala; heat and light); *A. Wijkander* (born 1849; professor at the Chalmers' Polytechnical College in Gothenburg; terrestrial magnetism); *J. R. Rydberg* (born 1854; spectrum analysis); *C. Mebius* (born 1854; electricity); *V. Carlheim-Gyllenskiöld* (born 1859; terrestrial magnetism); *E. Solander* (born 1862; terrestrial magnetism); and *P. G. D. Granqvist* (born 1866; electricity).

Chemistry.

As long as all opportunities of instruction in this subject were wanting in Sweden, this branch of science there found only few and casual followers. During the Era of the Political Greatness of Sweden, intercourse with foreign countries growing more frequent, the taste for chemical research and an appreciation of its value increased. Later, during the so-called »Era of Liberty», with its enthusiastic promotion of manufactures, it was the mining proprietors and promotors especially who busied themselves with chemical studies. Among the older chemists the following are worthy of mention: *J. Kunkel* (1630/1703; summoned from Rendsburg), who discovered and made known the method of producing phosphorus — formerly a secret — and made many important chemico-technical discoveries, more especially with regard to the manufacture of glass (bone glass, ruby glass); *U. Hjärne* (1641/1724), who started investigating Swedish mineral waters and turning them into account, more closely described formic acid, and observed and tried to explain the increase in gravity of metals under calcination. At his initiative Charles XI had a laboratory established, in 1685, at Stockholm, where, at the expense of the State, experiments were carried out, especially on behalf of the Royal Board of Mines. Hjärne himself was made the chief of this institution, one of the first laboratories known to have been fitted up by a State grant; *G. Brandt* (1694/1768), the discoverer of cobalt, and *H. T. Scheffer* (1710/59), known for his investigation of platinum.

The establishing of the first Swedish Chair of Chemistry at Uppsala, in 1750, was the harbinger of a new period noticeable for a more systematic and strictly scientific study of chemistry. The distinct practical bent of the foregoing period showed itself also in this at the beginning, but in the middle of the period pure chemistry also had its exponents of the highest rank. The phlogistic view governed the theoretic treatment of the science. A characteristic feature was the industry devoted to the development of blowpipe analysis.

Among chemists of distinction the following are deserving of mention, viz. *J. G. Wallerius* (1709/85), the founder of agricultural chemistry; *A. F. Cronstedt* (1722/65), the discoverer of nickel, and *Bergman* and *Scheele*, the first of a series of eminent Swedish chemists. — *T. O. Bergman* (1735/84) laid the foundation of the present doctrine of reagents and qualitative analysis in the wet way, and carried out important preliminary studies also in the direction of quantitative analysis; discovered the method of analyzing insoluble bodies by fusion with alkaline carbonate, increased the application of blowpipe chemistry, attempted to

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Statue of Karl Vilhelm Scheele, Stockholm.

express the various degrees of intensity of the elective attraction by a vast number of his so-called tables of affinity — works highly esteemed by his contemporaries —, pointed out the acid properties of carbonic acid and its occurrence in the atmosphere; demonstrated the cause of the difference between pig iron, steel, and soft iron. *K. V. Scheele* (1742/86) anticipated Priestley's discovery of oxygen (»fire-air«), ascertained its most important chemical features, and proved that the air is a mixture of this kind of gas and another, which he called »corrupted air« (= nitrogen); set up, in a phlogistic spirit, an independent hypothesis with regard to the phenomena of combustion; discovered the elements chlorine, barium, manganese, molybdenum, and tungsten, and, among more important inorganic combinations, arsenic acid, arsenetted hydrogen, hydrofluoric acid, and Prussic acid, proved that phosphorus renders iron »cold-short«, discovered the qualitative composition of sulphuretted hydrogen, examined the influence of sunlight on chloride of silver, disproved the view of the transformation of silicic acid into alumina and that of water into earth. Also in organic chemistry Scheele's experimental investigations broke the way for a new era. Glycerine and a large number of organic acids were discovered by him. — *J. G. Gahn* (1745/1818) showed the phosphoric acid to be a constituent of bone-earth, and for the first time showed this acid in the mineral kingdom.

With *J. J. Berzelius* (1779/1848) chemistry entered on a new stage. It was he who brought about the admission and application of antiphlogistic doctrines also into the scientific literature of Sweden. With these doctrines he combined the atomic hypothesis and the electro-chemical theory and thus formed a homogeneous system of theoretic chemistry. He determined the quantitative composition of the chief inorganic bodies, and showed that this can always be expressed by constant and simple numerical ratio, by which means he created a firm footing for Dalton's theory of atoms, and at the same time by aid of Gay-Lussac's law of volumes and by isomorphism he achieved an exact determination of the atomic weights of the elements; he systematically developed the oxide theory started by Lavoisier, and the dualism closely associated with it, of which, in the electro-chemical

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theory that bears his name, he sought to find a rational explanation; he perfected chemical nomenclature, and created the still existent system of chemical symbols, introduced the notion of isomerism, polymerism, and allotropism into chemistry, applied the doctrine of definite proportions to the minerals and organic combinations, devised a new system of mineralogy based on a chemical foundation, and (partly in conjunction with Liebig) set up the so-called older radical theory, one of the earliest attempts to explain the atomic structure of organic substances. He also discovered three new elements, viz., cerium, together with *V. Hisinger* (1766/1852), selenium, and thorium; isolated for the first time silicium and zirconium in the free state, was, through his researches on animal matter, also a pioneer of physiological chemistry, found out the method of decomposing silicates with hydrofluoric acid, and of separating metals by means of chlorine, established the use of platinum crucibles, wash-bottles, and caoutchouc tubes, founded the modern elementary analysis; extended the knowledge of blowpipe analysis beyond Sweden, published an extensive manual of chemistry, and exercised considerable critical influence, especially through his Chemical Annuals, published 1821/47.

Among other scientists of this period the following are remarkable: *A. G. Ekeberg* (1767/1813), the discoverer of tantalium; *M. M. af Pontin* (1781/1858), who, together with Berzelius, brought about the reduction of alkaline earths, and discovered the amalgam of ammonium; *N. G. Sefström* (1787/1845), the discoverer of vanadium; *J. A. Arfvedson* (1792/1841), an ardent analyst of minerals, the discoverer of lithium; and *K. G. Mosander* (1797/1858), who discovered four elements (later subdivided), viz., lanthanum, didymium, erbium, and terbium. [1]

After the time of Berzelius, chemical investigations proceeded at first on the lines laid down by the master, fairly undisturbed by the radical revolution that at this very period was taking place in chemistry on the Continent. *L. F. Svanberg* (1805/78) settled the atomic weight of several elements, and discovered the phosphomolybdic acid. *N. J. Berlin* (1812/91) effected the first more accurate determination of the atomic weight of chromium, and was a prolific writer of manuals of instruction. [2] *V. Eggertz* (1817/89) worked out some valuable methods for testing iron and iron ores. *K. V. Blomstrand* (1826/97) sought to effect a reconciliation between the system of Berzelius and »modern chemistry» by tracing the latter as a consequence of the former, and thereby prepared the way for a more modern method of regarding the science; he also contributed actively towards solving the question of the atomicity of the elements.

Chemical research in Sweden during the last period of the nineteenth century has more and more completely emerged from the isolation that enveloped it in the period consequent to the death of Berzelius, and, in a large number of different spheres, has left important contributions to the chemical researches of the times. *F. L. Ekman* (1830/90), the hydrographer, investigated the processes involved in the manufacture of sulphuric acid, and devised methods for analyzing water. *A. Nobel* (1833/96) invented dynamite and the smokeless powder that bears his name. *L. F. Nilson* (1840/99) carried out important investigations with regard to »coupled» combinations of platinum and to the rare earths, discovered scandium, determined the atomic weights and the atomicy of several elements, and also published numerous writings on analytical chemistry; finally he devoted himself to agricultural chemistry, and, on this subject, published important works

[1] One fact that speaks much for the important part played by Swedish scientists in the development of chemistry must be mentioned here, viz., that out of the total number of *elements* at present known (about 78), no less than 20 are discovered by Swedes. — [2] With regard to N. J. Berlin, his services in respect to popular education deserve to be remembered. His widely-known »Naturlära» (Physics), which has been translated into several foreign languages, has marked an epoch in the popular instruction of Sweden.

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Statue af Jöns Jakob Berzelius, Stockholm.

on the fat in cows' milk, the nutritive value of Swedish plants employed as fodder. the cultivation of sugar beets, fertilizers, etc. *E. Berglund* (1846/87) carried out valuable researches with regard to amido and imido-sulphonic acid, as well as works on analysis. *J. A. Bladin* (1856/1902) has made important synthetical works in the domain of organic chemistry (triazol- and tetrazol-bodies).

Among Swedish scientists now living who, by reason of their activity or position, may be regarded as the chief representatives of chemical research in their own country, the following may be enumerated, according to their respective ages: *H. v. Post* (born 1822; agricultural chemistry); *P. T. Cleve* (born 1840; inorganic and organic chemistry); *J. O. Rosenberg* (born 1840; general chemistry); *O. Hammarsten* (born 1841; physiological chemistry); *Å. G. Ekstrand* (born 1846; organic and technical chemistry); *S. O. Pettersson* (born 1848; physical chemistry and the analysis of gases); *P. Klason* (born 1848; organic chemistry, chemical technology); *O. Widman* (born 1852; organic chemistry, chemical nomenclature); *K. A. H. Mörner* (born 1854; physiological chemistry); *J. M. Lorén* (born 1856; chemistry and mineralogy); *S. Arrhenius* (born 1859; physical chemistry, the founder of the theory of electrolytic dissociation, see p. 477); *H. G. Söderbaum* (born 1862; organic and agricultural chemistry); all being professors or officials at the Universities or other public institutions.

Mathematics.

Though occupying quite at an early date a prominent position within several branches of the natural sciences, it was not until lately that Sweden asserted its rank in the domain of pure mathematics. *S. Klingenstierna* (1698/1765), an

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ingenious physicist of versatile endowments, famous chiefly for his discoveries in optics, was an eminent mathematician for his time, without, however, having achieved any work that can be regarded as forming a link in the general development of mathematics. As a teacher he enjoyed a high reputation, and he raised the mathematical instruction at Uppsala to a standard that kept pace with the scientific claims of the time.

K. J. D. Hill (1793/1875) was a gifted mathematician and produced a large number of works on the subject. *E. G. Björling* (1808/72) and *K. F. Lindman* (1816/1901) were noteworthy investigators within the higher analysis and are especially meritorious as authors of text-books on elementary mathematics.

K. J. Malmsten (1814/86) is epoch-making for mathematical studies in Sweden and has asserted his position in the history of mathematical science, principally on the strength of his work on the Euler summation formula. Malmsten, in his capacity of professor at Uppsala (1842/59), managed in a short space of time to raise the standard of mathematical instruction to a level with the universal scientific standpoint of the time. *Hj. Holmgren* (1822/85) attracted attention by his researches about the differential calculus with fractional indices; he also possessed an eminent talent as a teacher and lecturer. The same may be said of *F. V. Hultman* (1829/79), who, like Björling, deserved exceedingly well of the elementary instruction in Sweden. *K. E. Lundström* (1840/69) treated with great acumen certain problems in the calculus of variations.

During the last decades, Swedish mathematicians have been partaking in the work for the development of mathematical science in a way that has attracted great attention. This may be maintained concerning the two State universities as well as the newly established Private University of Stockholm.

The present advocates for mathematics at the State universities are *M. Falk* at Uppsala (born 1841) and *C. F. E. Björling* at Lund (born 1839), the former of whom has treated various questions of algebraic analysis and the theories of differential equations and of functions, whereas the latter preponderantly has been devoting his work to geometry. Amongst other mathematicians who have developed any considerable activity as authors may be mentioned: for Uppsala *H. T. Daug* (1828/88; infinitesimal goometry), *G. Dillner* (born 1832; theory of functions, differential equations), and *A. Berger* (1844/1901; theory of numbers). At the university of Lund *A. V. Bäcklund* (born 1845) has achieved important researches, both within the domain of geometry and that of the theory of partial differential equations; *T. Brodén* (born 1857) and *A. Wiman* (born 1865), now at the University of Uppsala, have also been occupying themselves with geometrical questions; besides those, Brodén has written several papers on the theory of functions and Wiman on certain parts of the higher algebra.

Through the foundation of the Private University of Stockholm (1878) — where, at the instruction, stated examination claims have not necessarily been to take into consideration and where thus scientific investigation is working under specially favourable circumstances — and by the starting (1882) of an international mathematical Review, the *Acta Mathematica*, under the editorship of G. Mittag-Leffler — Swedish mathematics has made considerable progress. This periodical, which among its collaborators counts many of the most prominent mathematicians of the time, occupies a position of note in the mathematical work of investigation in our days — a circumstance which is a good testimony of the corresponding development of the mathematical science in Sweden itself.

The first teachers of the subject in question at the University of Stockholm were *G. Mittag-Leffler* (born 1846) and *Sonja Kovalevski* (1850/91). Mittag-Leffler's chief works are the treatment of the problem of analytically setting forth functions of one variable in such a form as to reflect the characteristic attributes of the functions without the introduction of extraneous elements, also the con-

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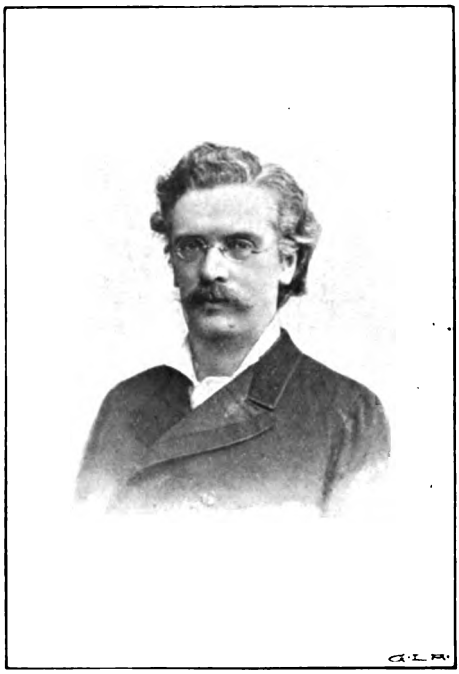

Gösta Mittag-Leffler.

struction of whole classes of analytical expressions that by their nature produce monogeneous functions of the most general character possible and also embrace and elucidate the true signification of Taylor's series. Among the works of Sonja Kovalevski ought to be mentioned the general integration of a system of partial differential equations and the solution of a new case of the rotation problem by means of uniform functions. Among other mathematicians who are, or have been, attached to the University of Stockholm, may be noticed: *E. Phragmén* (born 1863; since 1887 co-editor of the Acta Mathematica), an author of very discriminating disquisitions on the theory of functions and on the analytical theory of numbers; *I. Bendixson* (born 1861), an author of profound works on the general theory of functions and of differential equations; *H. v. Koch* (born 1870), known for his investigations on infinite determinants and for a paper on the analytical theory of numbers; *G. Kobb* (born 1863), who amongst other things, has treated the calculus of variations; and *I. Fredholm* (born 1866) who has given a new method for solving the problem of Dirichlet.

In the department of mathematical history *G. Enestrōm* (born 1852) has exercised an extensive activity as an investigator and as editor (since 1887) of the international magazine of mathematical history *Bibliotheca Mathematica*, which of late has been much enlarged and has put down on its programme the treatment of questions that are of actual interest to the mathematicians, such, for instance, as refer to terminology, classification, and bibliographical expedients.

Astronomy.

It is not till the beginning of the 17th century that we find astronomical research represented to any noticeable degree in Sweden. Our first astronomical observatory was founded in 1649 by *B. Hedræus* (1608/59), professor of Mechanics at Uppsala, who seems to have manufactured astronomical instruments in a workshop of his own. He also published a work, printed in Leyden, on the astrolabe. *A. Celsius* (1701/44) arranged for the construction of a new observatory in Uppsala (1740), which was very amply provided with instruments. When the French expedition for determining latitudes, under the leadership of Maupertuis, in 1736 proceeded to Lappland, Celsius volunteered to accompany it. He was also the first to direct attention to the influence of the aurora borealis on the magnetic needle. — In 1753 — the same year in which the Gregorian Calendar was introduced into Sweden — observatories were erected in Stockholm and Lund. *P. Wargentin* (1717/83) was the first Director of the Stockholm Observatory. He carried out many extensive observations, settled the latitude of

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the Observatory and its difference in longitude from Paris, and in 1751 took part together with the observers at the Cape, London, and Berlin in corresponding observations for determining the parallaxes of the sun and moon, and observed in Stockholm the transits of Venus in 1761 and 1769. The fame he enjoyed among his contemporaries was chiefly founded on the tables that he constructed for the satellites of Jupiter.

Anders Celsius.

At the beginning of the 19th century *D. Melanderhjelm* (1726/1810) of Uppsala initiated a new mensuration of latitudes in Lappland (1801/03), which was carried out by *J. Svanberg* (1771/1851). Several decades later (1850/51) this was followed by a Swedish-Russian mensuration of latitudes from Torneå to Fuglenæs (near Hammerfest in Norway), carried out by *N. H. Selander* (1804/70) in Stockholm, *J. M. Agardh* (1812/62) in Lund, and *D. G. Lindhagen* (born 1819), the last having been appointed at the Pulkova Observatory and taking part as Russian delegate. Lindhagen, later on appointed at the Stockholm Observatory, in conjunction with Fearnley in Christiania and Schjellerup at Copenhagen, carried out mensuration of longitudes between the Observatory at Stockholm and those of the towns above mentioned. — From the very beginning of the century geodetic-topographical work was taken up in Sweden with increasing interest. *S. A. Cronstrand* (1784/1850) and *K. P. Hällström* (1774/1836) actively took part in this by carrying out the determination of astronomical places for the work of mapping out Sweden. *Selander* and still more *P. G. Rosén* (born 1838; professor at the General Army Staff's Topographical Department in Stockholm) have carried out and advanced geodetical works in Sweden, which since 1863 entered as an integral part in the »International European measurement of Latitudes».

On a par with the above-mentioned measurements and observations, the work of scientific research has been most successfully carried on. *E. Prosperin* (1739/1803) is known for a table of comets often used and containing a register of the older comets from 837 A. D. down to 1795, together with determinants for the same in their nearest positions in respect to the earth. *A. Bredman* (1770/1859) published in the middle of the century an extensive manual entitled »Principles of Theoretical Astronomy». *G. Svanberg* (1802/82) has done excellent service in Swedish astronomical research by erecting a new Observatory in Uppsala, completed 1853. *H. Schultz* (1823/90) was a zealous observer, who acquired fame by his »Micrometrical observations of 500 Nebulæ», by his measurements of star-groups — the so-called »clusters» — and by his taking part, on behalf of Uppsala, in the corresponding observations on the planet Mars in 1862, for determining the solar parallax. — A new Observatory was erected at Lund in 1860 under the direction of *D. M. A. Möller* (1830/96), renowned for his researches with reference to the Faye-Möller comet; and the Stockholm Observatory was restored and enlarged 1877, after the Finnish astronomer *P. H.*

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Gyldén (1841/96) had been appointed director in 1871. Gyldén devoted himself chiefly to the perturbance theory, and has handed down his extensive studies on this subject in a number of short articles, as well as in a larger work entitled »Traité analytique des orbites absolues des huits planètes principales», of which, however, only the first part has appeared.

The present directors of the three Observatories are Prof. Dunér in Uppsala, Prof. Bohlin in Stockholm, and Prof. Charlier in Lund. *N. C. Dunér* (born 1839), who had before this published »Mesures micrométriques d'étoiles doubles», »Sur les étoiles à spectres de la troisième classe», and »Sur la rotation du soleil», has in Uppsala especially conducted researches with regard to the solar spectrum, the spectra of the fixed stars, and the variable stars. About the beginning of 1890 he succeeded in procuring a double-refractor of Repsold, a new movable tower, etc. *K. Bohlin* (born 1860) has published researches with regard to Tethys, the third satellite of Saturn, and on Winnecke's comet, as also »Formeln und Tafeln zur gruppenweisen Berechnung der allgemeinen Störungen benachbarter Planeten», »Développement des perturbations planétoires», astro-photographic researches, and besides several mathematical papers. *C. V. L. Charlier* (born 1862) has published a comprehensive work with regard to the planet Jupiter's perturbations of Thetis, and a work entitled »Ueber den Gang des Lichtes durch ein System von sphærischen Linsen». — Here are also to be mentioned: *A. Lindstedt* (born 1854), to begin with docent at Lund, later professor of mechanics at Dorpat, and at present professor at the Technical High School in Stockholm, who has made important investigations into Celestial mechanics, of which is especially worth mention the famous disquisition: »Sur la determination des distances mutuelles dans la problème des trois corps»; and *K. B. Hasselberg* (born 1848), appointed at the Pulkova Observatory in Russia 1872 as chief of the astro-physical institute, since 1888 the physicist of the Royal Academy of Sciences at Stockholm, who has made very exact researches as to the spectra of gases and metals, and several astro-physical investigations especially on the spectra of comets.

Since 1880, the Stockholm Observatory has been publishing Astronomical observations and researches carried on at the Observatory of Stockholm, and the Observatory at Lund also sends out Reports from the Lund Astronomical Observatory.

Many Swedish astronomers have been appointed to the Observatory at Pulkova (Russia) — one of the most renowned in the world. Since 1895, it is even administered by a Swedish astronomer, *J. O. Backlund* (born 1846), famous, among other things, for his wide researches with respect to the Encke comet. Also the vice-directorship is held since 1892 by a Swede — *M. Nyrén* (born 1837), who has specially treated the problem of the earth's rotation round its axis.

Meteorology and Hydrography.

For quite early historic periods in Sweden we have access to only very scanty statements regarding, for instance, the occurrence of great heat or cold, of drought or long rains, of good or bad harvests; from these it is only possible to arrive at a very rough general idea as to some of the climatic conditions then prevailing in this land. The earliest meteorological observations made with regularity within the present borders of Sweden are those instituted by Tyko Brahe, the famous Danish astronomer, at his observatory of Uranienborg on the island of Hven, which until the year 1658 belonged to Denmark. Those observations were made in the years 1582/97. The first regular meteorological observations made by Swedes, were taken under the auspices of the Uppsala

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Society of Sciences between the years 1720 and 1740 by *E. Burman* (1692/1729) and *A. Celsius* (1701/44), at first in Uppsala and subsequently a number of other places in Sweden. The lack, however, of accurate thermometers considerably diminishes the value of those records. It was not until about 1750, after Celsius and Linné had given the present graduation to the centigrade thermometer, that better results were obtained. In Uppsala tolerably good records have been kept (with a few gaps) ever since 1739, in Stockholm since 1754, and in Lund since 1740. Barometer and rain-gauge were also employed, though the results obtained were not accurate enough to have much scientific value according to the present request.

Already previous to that date (1750) Swedish investigators had been enquiring into the connection existing between the level of the water in rivers and lakes and the weather, and also into the question of the rise of the land, or, as it was then called, the shrinkage of the water. *U. Hjärne* (1641/1724) brought this matter up in 1694, *E. Svedenborg* (1688/1772), and *D. Tiselius* (1682/1744) were studying it in 1720, while *B. Vassenius* (1687/1771) published a series of essays, giving an essentially correct explanation of the connection in point; he had arrived at his conclusions by observations pursued for several years upon the weather and the level of the water in Lake Venern. At the present time we possess several fairly complete series of measurements of the level of the water in some of the largest sheets of water in the country; some of them date back to the last half of the 18th, others to the first half of the 19th century.

The Academy of Sciences, at the request of the »Societas Palatina» (founded at Mannheim in 1780), in 1785, organized the registering of meteorological observations at the principal colleges of the country, placing the supervision of the same in the hands of the lectors in Mathematics. By that means, a collection of very valuable records, extending over a long series of years, has been made, though the gaps in some places are numerous. Some private individuals have also since 1785 carried out observations over varying periods of time, and these too are of great value.

In 1848, *A. Erdmann* (1814/69) arranged for observations of meteorological and hydrographical phenomena to be regularly made at twenty lighthouses. In 1858, *E. Edlund* (1819/88) introduced a system of so-called Second-Class Stations, to take observations three times a day as to the height of the barometer, of the dry and wet bulb thermometers, force and direction of the wind, sky and clouds, rainfall, mists, dews, hoar-frosts, thunder, aurora borealis, etc., and also to take readings of the maximum and minimum thermometers and of the rain-gauge once in the twenty-four hours; the observations thus inaugurated have been continuously kept up ever since in practically unchanged form, save that some slight extensions of their scope have been introduced, and a few more stations have by degrees been established. The Second-Class Stations above described were in 1873 placed under the management of a special institution, founded that year and subordinate to the Academy of Sciences. That institution is the *Central Meteorological Office* in Stockholm, to which is entrusted both the work of superintending, systematizing, and publishing the meteorological observations made at the stations under its control, and also the maintenance of the telegraphic weather service, the object of which is to inform the general public as fully and reliably as possible about the present and near future with regard to the weather, more especially in the interests of navigation and agriculture. *R. Rubenson* (1829/1902) was appointed to preside over the Office.

In 1865, at Uppsala a series of meteorological observations began to be made for every hour, throughout day and night. *G. Svanberg* (1802/82) exercised control over and *Rubenson* had the guidance of these observations, which were made by voluntary observers, mostly undergraduates. In 1868, self-registering

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instruments, constructed by *A. G. Theorell* (1834/75), replaced the voluntary work for the most part. Certain phenomena, such as the configuration of the clouds, thunderstorms, and auroras, had, however, still to be taken personal note of. Thus it was that a so-called First Class *Meteorological Observatory* came into existence at Uppsala, it being the only one in Sweden. In 1873, *H. H. Hildebrandsson* (born 1838) became its head. In 1878, the observatory, until that time a subsection of the astronomical one, was made an independent institution, and its head became professor of meteorology.

In 1870, *K. B. Lilliehöök* (1809/90) instituted a regular system of observation on the state of the ice in Swedish navigable waters; these observations are entrusted to officials in the Pilot Service.

Early in the seventies, *Hildebrandsson* with the aid of the Agricultural Societies started a system of so-called Fourth Class Stations, at which notes were to be taken of the state of the ice, of thunderstorms, of frosty nights in the early autumn and late spring, and of certain phenomena in the animal and vegetable kingdoms. Later on, these stations were consigned to the superintendence of the Central Meteorological Office. At about the same period of time, Hildebrandsson organized an international series of observations on the passage of clouds, more especially of the cirrus clouds. In 1878, *H. E. Hamberg* (born 1847), also with the co-operation of the Agricultural Societies, introduced a system of so-called Third Class Stations, principally for registering daily amounts of rainfall, but also for the observation of air-temperature, etc. This system, too, has been taken in hand by the Central Meteorological Office. During the years 1876/97, *Hamberg* conducted a special inquiry at the office into the influence exercised by the forests of Sweden upon its climate.

In 1878, a *Nautico-Meteorological Office* was founded, to control and systematize the observations made on ocean-going steamers and at lighthouses, and also to take measurings of the level of the water off the coasts of Sweden and in its lakes, and to make other hydrographical investigations. Its head is *F. G. Malmberg* (born 1831).

In the year 1900, the number of stations in Sweden where meteorological observations were being made was: 1 of the first class, 63 of the second class (9 being private and 20 lighthouses), 382 of the third class (24 being lighthouses), and 91 of the fourth class.

Investigations upon the climate of Sweden have been made and published by *F. V. Ehrenheim* (1753/1828), *Edlund*, *Rubenson*, *Hildebrandsson*, *H. E. Hamberg*, and others; researches in dynamic meteorology have been published by *Hildebrandsson*, *H. E. Hamberg*, *N. Ekholm* (born 1848), and others. Several of these inquiries have been of direct practical use, as, for instance, in the service of the weather department of the Central Meteorological Office. Important from a practical point of view will also, doubtless, the investigations prove that *O. Pettersson* (born 1848) and *Hildebrandsson* have begun — the former in conjunction with hydrographical work, the latter by a purely meteorological method — into the reciprocal effects of the mean weather conditions at places situated far apart. Very notable researches as regards dynamic meteorology and hydrography have been made by *V. Bjerknes* (born in Kristiania 1862; now attached to the Private University of Stockholm) and his pupils *V. Ekman* (born 1874) and *J. V. Sandström* (born 1874).

The **hydrographical** investigations, now proceeding, of the waters encompassing Sweden, are of great interest and importance. They were commenced by *F. L. Ekman* (1830/90) in 1868, and have been pursued subsequently by *A. Wijkander* (born 1849), *O. Pettersson*, *G. Ekman* (born 1852), and others; their work is amplified by the biological research carried on by *Chr. Aurivillius* (born 1853) and *P. T. Cleve* (born 1840). Above all, however,

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Sven Otto Pettersson.

is here to be stated the important work by *O. Pettersson*, who has not only organized the system of the hydrographical sea exploring work but also has mightily contributed to the development of this science both by inventing a series of ingenious apparatuses in this regard, and by publishing comprehensive treatises on the matter. During the years 1893/01, the Swedish Hydrographical Commission, appointed by the Academy of Sciences in Stockholm, had the lead of our hydrographical sea exploring work. Since 1901, the researches are conducted on a wider basis in accordance with an international system, the lines of which were laid down by O. Pettersson at the International Hydrographical Congress held in Stockholm in 1899. By Royal Letter of January 25, 1901, the Swedish hydrographical-biological Commission was formed to lead the partaking of Sweden in the international work, in which, besides Russia and Finland, all the North-Sea countries take part, i. e., Great-Britain, Denmark, Norway, Germany, Belgium, and the Netherlands.

The hydrographical investigation of the rivers and lakes of Sweden being of great importance not only from a scientific, but also from a practical point of view, for agriculture, industry, forest economy, navigation, road and canal construction, etc., the State, the Agricultural Societies, the various localities and districts, and private individuals have all contributed to the furtherance of such investigation in different places up and down the country; works on the subject have been published by *O. Appelberg* (1852/1901), *G. Nerman* (born 1827), *L. Rosén* (born 1843), *A. Hamberg* (born 1863), and others. There is still wanting, however, a systematic organization for the whole country of the important work being done in this department. *L. Holmström* (born 1840) has treated in detail of the secular changes of level of the waters round the coasts of Sweden.

Of great significance for meteorological and hydrographical investigation have been the **Arctic** expeditions despatched from Sweden, more particularly since the happy idea occurred to *A. E. Nordenskiöld* (1832/1901) to equip the expedition he conducted in 1872 to Spitzbergen, to winter at Mossel Bay, with the appointments of a meteorological observatory of the first class. Hence, during the progress of both that and subsequent expeditions, observations have been taken, not only hour by hour of the ordinary phenomena of weather and terrestrial magnetism, but also of special features, such as height and movement of clouds, amount of sunshine, temperature of snow and ground at different depths, level of tidal waters, humidity of atmosphere, atmospheric electricity, auroras, etc. In this work the following have taken part amongst others: *A. Wijkander* (terrestrial magnetism, meteorology, etc.), *Ekholm* (meteorology), *S. A. Andrée* (born 1854; atmospheric electricity), *E. Solander* (born 1862; terrestrial magnetism), *V. Carlheim-Gyllenskiöld* (born 1859; auroras, terrestrial magnetism,

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etc.), *A. Hamberg* (maritime hydrography). Measurements of the altitude and movements of clouds were made by *Ekholm* in 1883 at Cape Thordsen in Spitzbergen, and, from 1884 onwards, in Uppsala by *Ekholm*, *K. L. Hagström* (born 1855), and others. It was determined at the international meteorological congress held at Munich in 1891, on the proposition of Hildebrandsson, that measurements of the same kind should be carried out simultaneously at a large number of different places; for Sweden these were conducted in Uppsala by *J. Westman* (born 1867) and *A. Lundal* (born 1864). Investigation as to the classification of clouds and the upper atmospheric currents has been carried on by *Hildebrandsson* and others. *Andrée*, in the course of nine balloon expeditions 1893/95, made observations of great value concerning the character of the upper regions of the atmosphere.

Rubenson brought together in a stout catalogue all the observations regarding aurora borealis made in Sweden up to the year 1877. With the aid of these and other observations, *S. Arrhenius* (born 1859) and *Ekholm* have discovered, or rather investigated, two remarkable periods of considerable amplitude of the auroræ (borealis and australis), atmospheric electricity and thunderstorms, one due to the moon's tropical period, the other to an unknown reason, perhaps the rotation of the sun. *Arrhenius* has further shown that the great climatic changes that took place on the Earth in the geological part may be explained in the main as due to comparatively slight variations in the percentage of carbonic dioxide contained in the atmosphere. The question of climatic changes has also been studied by *Ekholm*, who has arrived at similar conclusions.

The official publications on this subject are: »Bulletin mensuel de l'observatoire météorologique de l'Université d'Upsal»; »Observations météorologiques suédoises publiées par l'Académie royale des Sciences de Suède, exécutées et rédigées sous la direction de l'Institut Central de Météorologie» (Swedish and french); »Bulletin météorologique du Nord», published jointly by the meteorological institutions of Sweden, Norway, and Denmark. Semi-official is, moreover, »Monthly Survey of the Weather in Sweden, published in the service of agriculture, under the superintendence of the Central Meteorological Office» (Swedish), by *H. E. Hamberg*.

Scientific Travels. Geography.

In the great geographical discoveries at the dawn of modern times Sweden had no part, either as a founder of colonies or otherwise. Within the boundaries of their own country itself, however, in its northern districts, more especially Lappland, colonizing work of a very extensive character has fallen to the lot of Swedes. The first to give any account of those regions was *Olaus Magni* (1490/1558); he traversed Northern Sweden in 1518/19, penetrating at least as far as Öfver-Torneå. The large map of Northern Regions published by him at Venice in 1539, and still more his »Historia de Gentibus Septentrionalibus», printed in Rome in 1555, attracted great attention in the rest of Europe. During the succeeding years still greater notice was drawn to the North of Europe by reason of frontier disputes. The first detailed map of North Sweden was issued in 1611 by *A. Bureus* (1571/1646). The first scientific expedition equipped in Sweden had Lappland for its destination. It was despatched by King Charles XI in 1695; *J. Bilberg* (1646/1717) and *A. Spole* (1630/99), astronomers, and *Olof Rudbeck*, the Younger (1660/1740), botanist, were members of the expedition.

During the 17th century, the Era of Political Greatness of Sweden, the range of vision of our people was extended beyond the boundaries of their own

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country; but their attention was too fully engrossed on European battlefields to admit of any thought being given to countries farther distant and still unexplored. Thanks to private travelers and to embassies despatched to the rulers of remote lands, some acquaintance with the manners and customs prevailing there was for a certain spread in our country, but as regards geographical investigation, the results of those expeditions may be said to have been inappreciable or none at all. Attempts to found colonies, such as that of New Sweden, on the Delaware River, that existed from 1638 to 1655, or that of Cabo Corso on the coast of the Gulf of Guinea, that lasted from 1650 to 1663, did not succeed either in increasing materially the knowledge of those far distant parts in the mother country of Sweden. The descriptions, however, that were set down by Swedish pastors, who, even after political ties with Sweden had been severed, continued to journey thither to work among the population, are by no means of little value. The wars of Charles XII brought Sweden into contact with the East. By order of the King, *Kornelius Loos* (died 1738) visited in 1710/11 Egypt, Syria, and Asia Minor, bringing back from his travels maps, plans, and sketches; *M. Eneman* (1676/1714) also visited the same parts in 1711/13, principally for the sake of language study. The numerous Swedish prisoners conveyed to Siberia after the battle of Poltava greatly contributed to spread some knowledge of that country and the interior of Asia. Foremost among that band of geographical pioneers by force of circumstance stands *F. J. von Strahlenberg* (1676/1747), who drew up a large map of Siberia; *J. B. Müller* contributed descriptions of ethnographical interest of Ust Yansk, *A. Molin* gave an account of the peoples inhabiting the most easterly portion of Asia, among others of the Chukchi, while *L. Lange*, who entered the Russian service, visited China four times between the years 1715 and 1737.

When **Linné** had succeeded in reviving the study of the natural sciences, exploratory expeditions were undertaken on his initiative to various parts of the globe. In 1732, he himself made a journey into Lappland; *P. Kalm* (1716/79) traveled in North America 1748/51, *F. Hasselqvist* (1722/52) was in Egypt and Palestine 1749/52, *P. Osbeck* (1723/1805) went to China 1750/52, *P. Löfling* (1729/56) was in Spain and South America 1754/56, *A. Martin* went to the Arctic Ocean in 1758, *P. Forskål* (1732/63), to Arabia 1761/63, *K. P. Thunberg* (1743/1828), to the Cape of Good Hope, Java, and Japan 1770/79; *D. Solander* (1735/82) was with James Cook on his first voyage round the world 1768/71 and *A. Sparrman* (1748/1820) accompanied him on his second voyage round the world 1772/75. Here should be mentioned, too, *O. Swartz* (1760/1818), who visited the West Indies and portions of the American continent in 1783/85. Purely geographical discoveries were not part and parcel of the plan of these journeys, but the results that were attained have been of very great moment for many of the different branches of modern geography.

Of greater import in this department than any of those yet named was, however, *G. Wahlenberg* (1780/1851). On four journeys in Lappland (1800/10) and on expeditions in Switzerland and among the Carpathian Mountains he made numerous and reliable calculations of altitude and, moreover, noted down such important observations, more especially in the field of botany, that he has been accredited, along with Humboldt, with having created the science of plant-geography. In the first half of the 19th century, the number of explorers going to various parts of the world from Sweden in the interests of natural science was already quite a large one. Foremost among them stood *J. A. Wahlberg* (1810/56), who chose South Africa as his field of study. On his first journey he visited Natal, Zululand, and what is now the Transvaal; on a later journey in 1854 he started for the interior from Walfish Bay and penetrated as far as 17° 41′ S. Lat., but was killed by an elephant on March 6, 1856.

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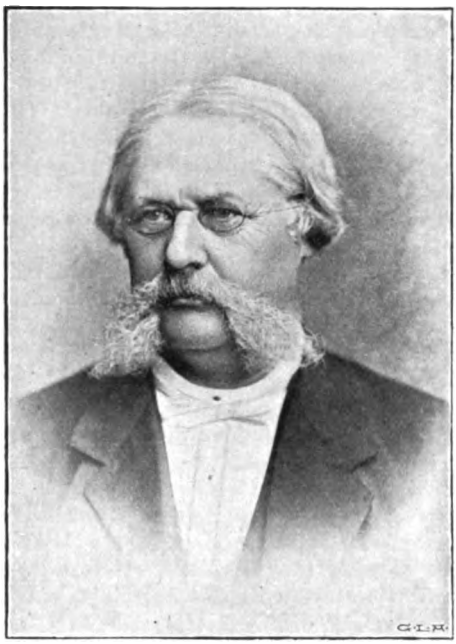
The greatest renown in geographical exploration won by Swedes has been in the **Arctic Zone.** The Swedish expeditions to those regions have inaugurated a new era in polar research, inasmuch as the object in view has been not merely to collect geographical data but to carry on an all-round and systematic inquiry into nature as it appears in that quarter of the globe. Most of the expeditions have thus been provided with a numerous staff of scientific men; moreover, as a school of experience for natural scientists the journeys to Arctic regions have been of great importance.



Otto Torell.

Swedish Polar Exploration may be said to date its origin from the journey to Spitzbergen made in 1837 by *S. Lovén* (1809 95). Then came one to Iceland in 1857 by *Otto Torell* (1828/1900), a first journey to Spitzbergen in 1858 by Torell and *A. E. Nordenskiöld* (1832 1901), one to Greenland by Torell in 1859, followed by the great Spitzbergen Expedition of 1861, headed by Torell and with Nordenskiöld and eight other naturalists on board; they made thorough investigation of the northern and western portions of the archipelago. A third Spitzbergen Expedition started in 1864 under the leadership of Nordenskiöld; the chief object in view on that occasion was to discover the feasibility of measuring degrees with Spitzbergen as a base; a fourth expedition under the same leadership took place in 1868. With the iron steamer the Sophia, a latitude of 82° 42′ N. was reached that year, a record being thereby established. In 1872 Nordenskiöld started off once more to Spitzbergen at the head of a large expedition, to try, if possible, to get yet farther north. The plan drawn up was, to winter in Spitzbergen and then in the spring to start off across the ice with reindeer from the northernmost parts of the archipelago. Certain mishaps that could not have been foreseen rendered this project abortive, and all that was done towards carrying it out was an excursion across the inland-ice in the North-East Land, undertaken by Nordenskiöld and *L. Palander* (born 1842), an excursion that yielded considerable fruit.

Spitzbergen and the adjacent islands having been tolerably well explored in the course of these journeys, Nordenskiöld next (in 1875) turned his attention eastwards to the Kara Sea, that had up to that time been regarded with so much dread. In the year named, he reached the mouth of the Yenisei in a common sailing vessel for whaling and repeated the experiment a year later with the same success, this time in a steamer. The experience thus gained giving support to the supposition of a North-East Passage being feasible, Nordenskiöld planned the celebrated expedition which has taken its name from the vessel engaged, the Vega. Under the command of *Palander* and with a large staff of scientists on board. the vessel left the harbour of Karlskrona on June 22, 1878. The calculations made proved to be justified throughout: the waters skirting the northern coast of Asia were free from ice and allowed of the Vega's rapidly passing the mouth of the Yenisei, the northernmost point of Asia, and the mouth of the Lena, serious

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inconvenience from ice not being encountered till in the vicinity of the Behring Straits. The Vega wintered, however, quite safely from Sept. 18, 1878, to July 18, 1879. Only a few days after the release from the ice that hemmed her in, the Vega completed the North-East Passage. Her journey home was one prolonged triumphal voyage, in acknowledgment of the accomplishment of one of the grandest exploits of the century in the domain of geographical discovery.

Adolf Erik Nordenskiöld.
By G. von Rosen.

The contributions made by Sweden in the direction of exploration did not, naturally, cease with the success and the glory of her Vega expedition. During the course of the eighties and nineties, a large number, both of expeditions of varying proportions and of individual explorers made their way to the Arctic regions. Among the leaders of these, besides *A. E. Nordenskiöld*, may be mentioned: *A. G. Nathorst* (born 1850), *G. De Geer* (born 1858), *G. Nordenskiöld*

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(1868 95), *J. Björling* (1871/93), *A. Hamberg* (born 1863), and *G. Kolthoff* (born 1845). In 1898, a large expedition under *A. G. Nathorst* mapped King Charles' Land and circumnavigated the Spitzbergen archipelago.

Salomon August Andree.

In the year 1895, *S. A. Andrée* (born 1854) brought forward his bold idea of reaching the North Pole by balloon, a plan based upon certain observations which he had made in a number of ascents, of the feasibility of steering balloons by means of tail-ropes. A large expedition was organized in 1896 for the realization of the plan and embarked for Spitzbergen; on arrival there, a large balloon-house was erected on Danish Island and the balloon was filled ready for a start. After nearly a month had been futilely spent in waiting for a favourable wind, the expedition was constrained to relinquish the project and return home. In the following year Andrée started again to renew the attempt, and on July 11, 1897, at 2·30 p. m., the Eagle (Örnen) Balloon rose into the air from Port Virgo. Since that date no reliable information as regards Andrée and his two companions, *K. Frænkel* (born 1870) and *N. Strindberg* (born 1872), has come to hand, save such as is afforded by certain drift-buoys, thrown out of the balloon and found on and near Iceland, in Norway, and on King Charles' Land, and by a carrier pigeon, discovered north of Spitzbergen, bearing a message to the effect that, on July 13 at noon, the balloon had reached a latitude of 82° 2′ N. and was at 15° 5′ East Long. As far as can be gathered from these data, it would seem as though the balloon voyage had terminated in the regions S. E. of Francis Joseph Land. The searches that have been made to try and discover the fate of the balloonists have unfortunately hitherto proved fruitless. Expeditions have been undertaken for the purpose by *J. Stadling* (born 1847) and by *F. Martin* (born 1868) to Siberia, and by *A. G. Nathorst* to Spitzbergen and the adjacent islands and to N. W. Greenland. An expedition specially equipped for search was despatched to Greenland in 1899; though unsuccessful in their main object, they were able to draw a map of the deep Francis Joseph Fiord and came upon another large fiord south of it, which received the name King Oscar Fiord.

The latest enterprise in arctic waters emanating from Sweden is the extensive determining of degrees that is being carried on in Spitzbergen. The Swedish section of the work, under *E. Jäderin* (born 1852) and, since 1901, under *G. De Geer*, accomplished the preliminary investigations and other work in 1898 and spent the winter of 1899/1900 in those regions. During 1902 the work was carried on under the direction of *T. Rubin* (born 1874). The other section of the work is being carried out by, and at the expense of, Russia.

The results of Swedish exploration in Polar regions may be concisely stated thus: Spitzbergen, the adjacent islands and archipelagoes, and portions of the coasts

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of Northern Asia and Greenland previously unknown, have been mapped out for the first time, and, furthermore, very important contributions have been made to the general knowledge of the whole Polar region from Baffin's Bay in the West to the Behring Straits in the East. Besides those who have actually taken active part in one or other of the expeditions, two other names must be mentioned of men who by their munificent support have rendered great service to arctic exploration, viz.: H. M. King *Oscar II* and *Oscar Dickson* (1823/97).

In other parts of the world, also, Swedish explorers have been busy within the last part of the 19th century. We have not space here to do more than record some of the most important among these labours.

In **Asia**. *Sven Hedin* (born 1865) has made two journeys in Persia 1885/86 and 1890/91, and two through Central Asia. On the first journey in Central Asia (1893/97), he traversed, partly on paths till then untrodden, Pamir, the Takla-makan Desert, the Tarim Valley, and North Thibet, and then returned through Mongolia and Siberia. In 1899/02, Hedin accomplished his latest and greatest journey; he navigated the Tarim River on a ferry boat for 1,500 miles, mapped all the region of ancient Lop-nor, and discovered most important ruins in this part of Asia from the 3rd century A. D. Then he crossed Thibet on six different lines and tried to reach Lassa in disguise. The popular description of this journey is also published in England. The scientific results are extremely rich, and a map of the whole road has been made in no less than 1,149 sheets. — Ethnographical research has been carried on by *Hj. Stolpe* (born 1841) in India and by *F. Martin* in Russian Asia, geological by *Hj. Sjögren* (born 1856) in the Caucasus and the Transcaspian countries.

Sven Hedin.

Africa has tempted many Swedish explorers and travelers. *Wahlberg's* mantle was assumed by *Charles Andersson* (1827/67), who traveled 1850/67 through the Damara and Ovambo Territories. His activity as a commercial man and as a collector of natural history objects, etc., has been continued by *A. Ericsson*. In the service of the recently constituted Congo State, numbers of Swedes have been engaged. Of those who have won a reputation by their published writings, or by the collections they have made, relative to Africa may be mentioned: *E. Gleerup* (born 1860), *P. Möller* (born 1858), *G. Pagels* (1855/91), *A. Wester* (born 1856), *M. Juhlin-Dannfelt* (1859/97), and *H. H. v. Schwerin* (born 1853). In the Kamerun Territory *G. Waldau* (born 1862) and *K. Knutson* (born 1857) have done similar work to that effected by A. Ericsson further south. In Sudan *L. Jägerskiöld* (born 1867) has made, in 1901, a scientific expedition.

In **South America**. *Anders Regnell* (1807/84), a Swedish physician, took up his residence in Brazil in the year 1840, and during the remainder of his life devoted himself with the greatest success to promoting the study of Brazilian natural history; he also gave large sums of money during his lifetime and by will, to

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enable Swedish scientists to pursue investigation in the country of his adoption. *O. Nordenskjöld* (born 1869) visited the Magellan Territories in 1895/97 and directed in 1901/03 the Swedish Antarctic Expedition that made researches in different parts of the Southern polar regions: South Shetland Islands, Graham Land, South Georgia, Falkland Islands, etc. The expedition lost its ship »Antarctic» but was delivered by an Argentine relief expedition under Captain *Irizar* in November 1903.

In **Central** and **North America.** *C. V. Hartman* in 1896/99 made prolonged and extensive archeological and ethnographical researches in Central America, while *G. Nordenskiöld* (1868 95) did some important archeological excavating work, in 1891, on the southern borders of the United States.

These and many other scientific journeys undertaken by Swedes during the latter part of last century were not, as will be seen, primarily concerned with geographical discovery, but rather with natural history research in manifold directions. The results arrived at have been made public, partly in special descriptions of travel, but, as regards their scientific phase, for the most part in the Transactions and other publications of the Royal Academy of Sciences in Stockholm. In promoting geographical and ethnographical research, the Anthropological Society, founded in Stockholm in 1873 and transformed in 1877 into the Swedish Society for Anthropology and Geography, has been of considerable service, especially through its journal the »Ymer», which attained its twentythird year of publication in 1903.

In the domain of the **history** of geography and cartography, Sweden saw the production of two original and important works by *A. E. Nordenskiöld:* the Facsimile Atlas (1889) and Periplus (1897); another important contribution to the same field is The French Voyages to the Southern Ocean (1900) by *E. W. Dahlgren* (born 1848).

As a pendant to the above summary of contributions rendered by Swedes to geographical research outside their own borders, it may be well to show how the **home-country** and its geography have step by step been more closely and more scientifically investigated and made known.

It was not until 1611, after considerable preliminary work on his own part and that of others, that the above-mentioned *A. Bureus* succeeded in producing the first map, in a modern sense, of Northern Scandinavia; for that time his production was very creditable. In 1626, another map appeared, embracing Scandinavia and adjacent countries. The appearance of these maps denoted a very great advance in the knowledge of the geography of the country and they formed the foundation of all subsequent maps of Sweden during the succeeding century, whether of home or foreign production. Land-surveying, which was introduced in 1628, was instrumental in amassing increasingly accurate information as to the geographical conditions of the inhabited parts of the country. By the close of the 17th century it may be assumed that the main features of Sweden in geographical regard were familiar to the administrators of the country, though they deemed it desirable for political considerations to withhold the more detailed maps from the general public. An historical account of the development of Swedish maps is given by *S. Lönborg* (born 1871) in his work »Sveriges karta, tiden till omkring 1850», published in 1903. For further information on maps and mapping work in general, the reader is referred to a special section Official Maps.

With the dawn of the 18th century, interest began to be very generally aroused in the prosecution of journeys within Sweden itself, by men of skill and experience who were able to collect observations on a great variety of subjects. The journeys best known are those of *Urban Hjärne* (1641/1724) and of *Olof Rudbeck*, the Younger (1660 1740). As the 18th century advanced, the value of the accurate investigation of the country, carried out by specially equipped and

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well-qualified travelers, was more and more recognized. *Linné* (1707/78) was despatched by the Government of the day to different parts of the country, and his descriptions of his numerous journeyings may be said to be the best literature on the subject published in the 18th century. They contributed, moreover, incalculably, by their wealth of ethnographical and also geographical illustrative data to stimulate an interest in the description of definite localities; many of the clergy of his day were, moreover, induced by his example to commit to paper very valuable accounts of the districts in which their work lay. The materials forthcoming in that manner have formed a basis for subsequent descriptive surveys of the whole country; the best of these probably were that from the hand of *Daniel Djurberg* (1744/1834) and one by *K. V. S. Tham* (1812/73): A Description of the Realm of Sweden, published 1849/55, but unfortunately never completed.

Though the works named and others contain many valuable and interesting facts, yet they do not naturally come up to the standard expected at the present day of a geographical work. Descriptions of the whole country and of its divisions, based upon thoroughly scientific investigation, are still wanting. The work of the past few decades has been concerned principally with the collection of new and more extensive materials and with the discussion of small areas in detail. The researches made by the Geological Survey of Sweden and by a number of private individuals, into the origin of the fundamental rocks, the formations from the Glacial Epoch, and the variations in the level of the land that have occurred in the Scandinavian peninsula, have rendered the study of the conformation of the country a more thorough and profound one, but they belong exclusively to the domain of Physical geography. Thanks to the labours of *A. E. Törnebohm* (born 1838), *A. Hamberg* (born 1863), *Fr. Svenonius* (born 1852), *P. Holmquist* (born 1866), and others, our knowledge of alpine regions in North Sweden, formerly rather inaccessible, has been very materially increased latterly. A comprehensive survey of the numerous investigations of the Quaternary deposits — embodied for the most part in the publications of the above-named Geological Survey of Sweden and of the Geological Society in Stockholm — was given by *G. De Geer* in 1896 in: The Geographical Development of Sweden after the Glacial Epoch. The evolution, too, of organic life has also recently been made the subject of study, whereby, on the basis of investigations on peat-mosses and other formations, new light has been thrown upon it. The main results of the work hitherto carried out in this field are to be found summarized in: The History of the Swedish Plant-world, by *Gunnar Andersson* (born 1865). The seas that encompass Scandinavia have been studied with an elaborateness previously unthought of, and on partially new methods, by *F. L. Ekman* (1830/90), *O. Pettersson* (born 1848), *P. T. Cleve* (born 1840), and others. Their results have been registered in scientific papers and treatises, included, as a rule, among the publications of the Academy of Sciences. In statistical and economical regard is to be remembered the thorough and comprehensive investigations of the celebrated Swedish Demography as well as the publications in other branches of our official statistics. In the fields of ethnography and language a great amount of material has been collected, though the working up of it has not as yet, save in exceptional instances, proceeded far enough for the geographical results to be obtainable. The North Museum at Stockholm and the records collected and preserved by the various Dialect Associations at the universities, together with the publications of those bodies, form an abundant stock of material, from which at some future date an exhaustive geographical treatment of these phases of the Swedish national character and culture may arise. In one or two cases, the preliminary work spoken of has so far advanced that descriptions of the several provinces have been already planned, giving a faithful picture of the development of the province in every direction. The first part of the account of the province of Uppland appeared in 1901.

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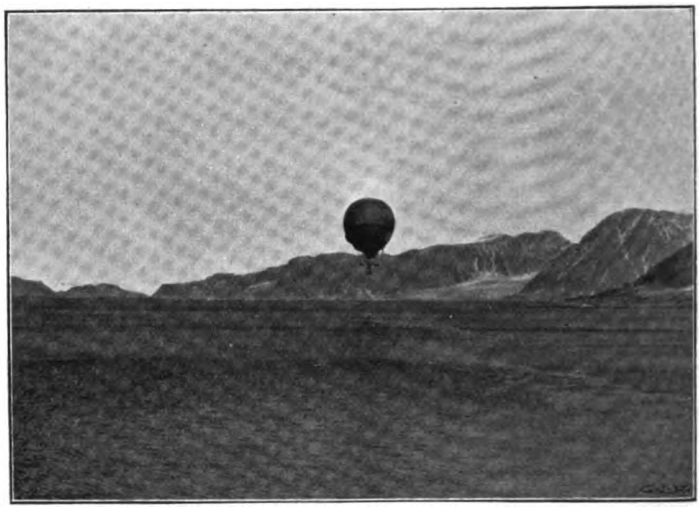
Gaps in the knowledge possessed of the exact geography of the country are still numerous and wide, largely owing to the fact that considerable areas are still incompletely mapped; it will, consequently, take a long time before an entirely satisfactory survey of Swedish geography can be given. The importance, however, of geographical research has of late been increasingly acknowledged; the University of Lund established a chair in the subject in 1884, and that of Uppsala likewise in 1901.



Andrée's start for the Pole, July 11, 1897.

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V.

OCCUPATIONS AND INDUSTRIES.

A GENERAL SURVEY.

Sweden is among the number of larger European countries, with extent principally from north to south. This circumstance accounts for the exceedingly great variety of climate and conditions connected therewith that is to be found within the borders of the country, it being far greater than in the majority of other countries. Thus, between the luxuriant plains of Skåne and the Alpine wilds of Lappland the contrast is indeed vast, though the intervening provinces afford a gradual transit from the one to the other. By reason of its multifarious possibilities, Sweden may be said to form, as it were, a world by itself. In configuration, it is one connected body of land, two thirds of the boundary of which are washed by the sea. In the interior, there are great numbers of sheets of water (many of them very large) and of water-courses, some of them large navigable rivers, others again broad streams with rapids and waterfalls. Of the total area of the country (44,786,227 hectares) no less than 3,666,739 hectares are water, leaving a total of 41,119,488 hectares as the actual *land* area. How this area is at present apportioned in the different categories: unfertile, fertile, and the subdivisions of the latter, will be roughly seen from the figures given in the subjoined Table.

TABLE 54. *The disposition of Swedish land, in 1900.*

Parts of the country.*	Total area of land. Hectares.	Area, in hectares (à 2·47 acres).			Per cent.		
		Arable land and natural meadow.	Forests.	Other land.	Field and meadow.	Forests.	Other land.
Skåne	**1,095,000**	655,000	271,000	169,000	59·8	24·8	15·4
Småland	**3,048,000**	733,000	1,212,000	1,103,000	24·0	39·8	36·2
Rest of Götaland	**4,555,000**	1,402,000	1,969,000	1,184,000	30·8	43·2	26·0
East Svealand	**3,362,000**	930,000	1,837,000	595,000	27·7	54·6	17·7
West Svealand	**4,570,000**	447,000	3,436,000	687,000	9·8	75·2	15·0
South Norrland	**8,995,000**	397,000	6,447,000	2,151,000	4·4	71·7	23·9
North Norrland	**15,494,000**	454,000	5,535,000	9,505,000	2·9	35·7	61·4
Total	**41,119,000**	**5,018,000**	**20,707,000**	**15,394,000**	**12·2**	**50·4**	**37·4**

* Småland here also includes Öland. West Svealand = The Läns of Vermland and Kopparberg. North Norrland = The Läns of Vesterbotten and Norrbotten.

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Following upon this preliminary survey of the country as being the scene of the various activities in pursuit of a livelihood of its inhabitants, there may be adduced here certain data concerning those inhabitants themselves, arranged in groups according to the several branches of industry in which they are principally engaged and from which they derive their subsistence. Table 55 classifies the Swedish population into main groups according to their professions at different dates during the course of the last few decades.

TABLE 55. *Population of Sweden by greater groups of profession.*

Professions.	Population.			Per cent.		
	In 1870.	In 1890.	In 1900.[1]	1870.	1890.	1900.
Agriculture and fishing	2,995,844	2,914,984	2,841,000	71·87	60·92	55·32
Industry[2]	613,414	1,087,072	1,391,000	14·71	22·72	27·08
Trade and transport	210,940	426,911	538,000	5·06	8·92	10·47
Public service, etc.[3]	348,327	356,014	366,000	8·36	7·44	7·13
Total	4,168,525	4,784,981	5,136,000	100	100	100

These two Tables, dealing with *Land* and *People*, afford, as it were, a chart of the industries and occupations of the people of the country, not only as to what they now are, but what they were in the past and what they show signs of developing into in the future. In rough outline, a picture may here be obtained of the present industrial life of the country.

It will be observed that **Agriculture** is one of the main industries in Sweden, where it has from olden times gone by the honourable name of the *mother* (or *staple*) *industry*. There is certainly no more than 12 % of the total landarea of the country at present given up to tillage and meadows, whereas in Western Europe the average is 44 %; but the vast extent of Sweden in comparison to its population must be borne in mind. Sweden possesses about 1 hectare of land under culture, or meadow, for every inhabitant, whereas Western Europe has only about $^2/_3$ hectare on an average. These figures show plainly that the cultivation of the land plays a more important part in the industrial life of Sweden than in the generality of Western European States. Table 55, however, shows us too, that agriculture is fast decreasing in importance, here as elsewhere. Not merely is the number of those engaged in and earning their livelihood by agricultural pursuits *relatively* smaller than it was 30 years ago; this is actually *absolutely*

[1] Approximate calculation. — [2] Mining and forestry inclusive. — [3] Professions of art and literature, physicians, etc., inclusive.

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the case, notwithstanding the not inconsiderable increase in population since that time. The *relative* diminution denotes that mechanical industry and trade etc. have grown into mighty rivals of agriculture, that formerly occupied so dominant a position as a source of livelihood. The *absolute* retrogression in the numbers of those engaged in the pursuit of agriculture, on the other hand, points to changes that have come to pass in the industry itself. Machinery has forced its way into the service of agriculturists in Sweden, replacing human labour, tending to become continuously more expensive, and by this means agriculture has itself been to a great extent industrialized. The result of this transformation is to be traced in the immense development of farm-stock keeping and the great export of dairy-produce, as well as in the attention being given in Skåne to the cultivation of sugar-beet for a sugar industry on a large scale that has sprung up there. Consequently agriculture, both as regards its own methods and the produce it places on the market, has been drawn in to share in the triumphal march that industrialism is now making through the world. There is every sign that this tendency will become stronger and stronger.

The largest section of the land in Sweden devoted to one form of culture is that of the **Forests.** As a natural result, forestry constitutes one of the main industries of the country. The labour involved in the case of forests is far less than that in agriculture, hence the comparatively small number of those who obtain a livelihood out of it. The forests of the country are, however, one of its principal sources of wealth. The timber exported from the country constitutes nearly half the total exports, and Sweden is nowadays the greatest seller of timber in the markets of the world, at all events in normal years. By an increasing care in the management of forests (hitherto much neglected), the immense capital contained in them will be preserved for the future; thanks, too, to the improvements that are unceasingly being introduced into the home industrial undertakings concerned in the manipulation of the raw produce of the forests into articles of household and commercial, etc. use, such as cabinet and furniture factories, and paper and pulp mills, the country is more and more obtaining the full benefit of this very important source of national wealth.

More than 15 million hectares are noted in Table 54 above as being *other land*, that is to say: other than such as is under cultivation, or occupied by forests. Of this vast area, however, there are some not inconsiderable portions that, it is supposed, would lend themselves to cultivation or the growth of forests, when times shall be such as to admit of their being taken in hand for the purpose. The greatest part, however, of the area is rocky and mountainous, and consequently unfertile, yet not for that reason unprofitable. For in

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these mountains Nature has concealed another of Sweden's principal sources of wealth: its well-nigh unbounded iron ore fields. There is a great belt of these extending right across the central part of the country, consisting of the purest ore in the whole world. The main mass of ore, however, is to be found in the mountainous districts of Lappland, inaccessible until lately, but now opened up to the markets of the world by means of recently constructed railways. Many other mineral treasures, too, lie hidden away in the Swedish mountains. Hence, naturally enough, **Mining** has been from time immemorial one of the foremost industries of the country. For a long period, it may be mentioned, Sweden was the greatest producer of iron in Europe; the employment, however, of fossil coal in the manufacture of pig iron produced a revolution in the industry. Since that time the want of fossil fuel has formed the chief obstacle to the rapid development of industry in Sweden. The lack of coal is the cause, too, of the iron trade in Lappland being merely a trade in the raw product. Notwithstanding, the increase in number and extent of foundries, machine-shops, etc., during the last few decades, would seem to show that in this department, as in that of the timber trade, a change is being effected, and that a transition to a manufacturing industry on a large scale is on the high road to establishment.

The lack of coal — that mineral only being found in NW. Skåne and in quite insufficient quantity to meet the demands of the country — together with the great extent of territory and consequent difficulty and costliness of communications have furthermore been the chief causes of **Mechanical Industry** having long occupied a less important position in Sweden. During the last few decades, however, a distinct change in this state of things has taken place. Numbers of new branches of manufacture have been started, and those existing before have increased their output by many times, with the result that the value of the manufactures of the country has immensely increased, and for the year 1900 was estimated at 1,050 million kronor (apart from the produce of mines and dairies), while the population deriving subsistence from manufacture has more than doubled since 1870. Industry on a large scale has therefore set its foot on Swedish soil, and bids fair before long to place the country among the more principal centers of the world's industrial life — in spite of the lack of coal, but by virtue of the abundant supply of that other grand natural source of power for industrial enterprise: *waterfalls*.

Commerce and **Navigation** come next on the list of the most important occupations of the population. Owing to the great extent of coast-line, to the numbers of harbours, and to the well developed system of waterways in the interior of the country — rendered possible in the first instance by the great inland lakes and extended further by very considerable canal-constructions — the home navigation is

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very brisk; moreover, by reason of the great differences in the character and products of the various provinces, to which reference was made above, interchange of these products is conducted on a very extensive scale, causing the internal trade of the country to be unusually large. By means, too, of a railway system, that in proportion to the population of the country is the greatest in Europe, the vast distances and consequent inconveniences have been to an appreciable extent lessened, and the interior parts of the country have thereby also been opened up to foreign commerce. External commerce has made great advances during the last few decades; it is, however, without doubt still capable of very considerable improvement. That is specially the case with regard to *Navigation on foreign countries*, which a revival of interest is seeking to arouse from the state of torpor into which a chain of unfavourable circumstances forced it during the last quarter of the 19th century. The very considerable progress made, notwithstanding, since 1870, in commerce and navigation, is best seen by reference to Table 55, where the great increase in the numbers of those earning their living thereby may be observed.

Fishery occupies a less important place. It is true that the innumerable lakes and rivers in the interior of the country, no less than the seas encompassing it, are in many places well supplied with fish, yet their resources in this regard do not compare with those of the world's oceans. Moreover, for a not inconsiderable part of the year the waters of Sweden are frozen hard, the scope for the industry of fishing being thereby materially restricted. Finally **Shooting** that in earlier times constituted a very important source of livelihood, can no longer be counted as such or as a special branch of pursuit to that end. Nowadays, it can only be regarded as primarily a form of diversion or sport.

This brief account will have been sufficient to show that the sources of livelihood in Sweden are multifarious and far-reaching. Furthermore, it appears from what has been said that Sweden is in the midst of a transforming process that has been in progress for a generation, and the ultimate goal of which is: *the conversion of the raw-product industry into a manufacturing one* and *the invasion of modern industrialism into every department of the occupations of the people.* In other words, the phases of development experienced in the great civilized countries are also in evidence in Sweden. Concomitant with them, too, here as there, is a constantly increasing well-being among the people and a rapid growth in national prosperity. We purpose to touch in brief outline also upon this phase of Sweden's national economy, together with its recent developments.

Before proceeding to these calculations, it may be well for us to present an idea of the *fluctuations* of Sweden's economical life in our days by giving certain data concerning this matter for the years 1866—1900.

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Economical Conjunctures in Sweden between the Years 1866 and 1900.

In our times, to a still greater extent than in earlier days, the economical life of a country is subject to constant changes from favourable to unfavourable conjunctures and vice versa — the occurence of events that exercise an influence in one direction or another on the

TABLE 56. *Some principal economical data of Sweden, during 1866/1900.*[6]

In	Per 1,000 inhabitants.			Cereal crop.	Prices on rye.[2]	Summer wages for a day's work.[3]	Export of wood.	Mining of iron ore.	Assessed income.[4]	Money drawn from Savings' banks, in %.[5]
	Marriages.	Excess of births.	Net emigration.[1]	Thousands of quintals.	Kronor per quintal	Kronor.	Million kronor.	Thousands of tons.	Million kronor.	
1866...	6·72	13·18	1·75	15,425	12·48	1·25	.	491	162·5	100
1867...	6·09	11·19	2·80	12,748	18·90	1·14	.	502	161·0	96
1868...	5·46	6·49	6·91	12,426	17·81	1·12	.	546	158·6	95
1869...	5·64	5·98	10·12	18,686	12·48	1·10	.	598	158·7	84
1870...	6·02	8·98	5·08	19,919	12·11	1·14	.	630	161·4	62
1871...	6·49	13·21	4·14	20,517	12·95	1·33	57·78	663	170·6	56
1872...	6·98	13·76	3·69	17,153	13·75	1·72	80·47	732	190·3	60
1873...	7·31	13·60	2·90	19,503	15·50	2·01	96·19	832	226·5	61
1874...	7·27	10·53	1·28	15,018	15·35	2·01	103·98	926	264·6	68
1875...	7·05	10·90	1·75	20,170	13·97	2·01	85·33	822	273·6	92
1876...	7·08	11·25	1·55	17,574	13·97	1·98	103·95	797	281·6	91
1877...	6·88	12·41	1·07	16,364	14·01	1·70	113·40	739	295·1	117
1878...	6·47	11·77	1·51	20,874	12·16	1·54	68·48	677	294·4	149
1879...	6·29	13·58	3·68	19,710	12·05	1·45	65·98	645	274·2	135
1880...	6·82	11·26	9·40	21,994	14·91	1·46	89·73	775	286·0	88
1881...	6·19	11·39	10·48	17,755	15·78	1·51	94·90	826	304·5	84
1882...	6·33	12·00	11·29	22,888	12·58	1·52	104·97	893	318·2	88
1883...	6·48	11·63	6·66	19,881	12·26	1·57	99·68	885	331·6	82
1884...	6·53	12·48	4·55	22,493	11·86	1·61	90·19	910	331·9	89
1885...	6·68	11·69	3·80	20,326	9·92	1·53	92·79	873	348·8	90
1886...	6·41	13·15	5·89	22,200	9·45	1·54	74·91	872	345·0	96
1887...	6·25	13·53	9·77	22,927	8·01	1·48	82·67	903	349·6	100
1888...	5·92	12·79	9·59	20,825	10·42	1·53	109·70	960	355·2	92
1889...	5·98	11·75	5·85	19,271	11·09	1·61	116·74	986	380·8	88
1890...	5·99	10·83	5·90	25,357	11·80	1·72	108·57	941	410·7	99
1891...	5·83	11·46	7·64	22,228	15·15	1·75	111·38	987	418·4	99
1892...	5·69	9·10	8·11	25,112	11·83	1·78	109·29	1,294	425·1	103
1893...	5·65	10·53	6·96	22,096	10·47	1·79	113·43	1,484	431·5	88
1894...	5·74	10·72	0·60	23,790	8·91	1·80	116·96	1,927	447·5	86
1895...	5·87	12·30	2·18	23,751	9·74	1·80	114·43	1,905	464·9	86
1896...	5·95	11·54	2·38	22,557	10·41	1·82	131·21	2,039	495·4	82
1897...	6·06	11·32	1·34	23,067	11·30	1·92	150·30	2,087	538·2	83
1898...	6·14	12·03	1·00	24,524	11·70	2·08	146·40	2,303	601·4	91
1899...	6·24	8·70	1·71	20,688	13·01	2·22	140·12	2,435	659·6	108
1900...	6·15	10·16	2·47	26,470	12·47	2·23	153·75	2,610	715·9	102

[1] For the years 1866/84 with approximate corrections in the official figures. — [2] Official prices; see table 74 and note thereto. — [3] For male agricultural workers. — [4] Of capital and labour (not of real property), according to the taxation lists. — [5] In per cent of the money deposited during each year. — [6] A quintal = 100 kilograms = 1·97 cwts; a krona = 1·10 shilling = 0·268 dollar; a ton = metric ton à 1,000 kilogr. or 2,204 lbs.

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great markets of the world often bears upon the most remote regions of the globe. Alongside these great waves of influence, however, there are often smaller ones, due to purely local causes, that sometimes heighten, sometimes diminish or altogether counteract those from the world at large. Some idea of such vicissitudes, arisen in the history of Sweden's economical life during the past generation, may be obtained from Table 56, containing certain characteristic data concerning this matter, culled from different sections.

The period 1866/70 was, on the whole, a particularly unfavourable one for Sweden, as will be seen from the Table opposite. The cause was, however, principally of local nature, viz. the wretched harvests of 1866, 1867, and 1868. This has proved, as a matter of fact, to be the last time that internal causes of that nature have appeared as determining factors in our economical life. Since that period the condition of things here has been, almost without exception, fully in touch with that in the world at large.

The earlier seventies have been acknowledged everywhere to have constituted a period of unparalleled economical prosperity, and that is true of our own country in as high a degree as of any, and here, indeed, the reaction tarried in setting in as long as until 1878. The period 1879/87, again, was very generally, with but few breaks, one of economical weakness, and things were not, as a rule, much better between 1888 and 1893. Swedish agriculture especially, as that of Europe generally, experienced bad times throughout the period 1879/93. Since the latter date, things have improved in this respect, but previous to that time an era of grand development had set in for Swedish mechanical industry owing to internal causes, and this era is coinciding since 1894 with the general economic expansion that has made itself so palpably felt in Europe during the years 1895/1900. One result of this condition of things, is the great diminution in the number of emigrants during

TABLE 57. *Assessed value of real property in Sweden.* Million Kronor.

In	Total value of real property.			Owned by			Real property in private hands.		Real property belonging to the State.	
	Landed.	Other.	Total.	Private persons.	The State.	Communities.[1]	Landed.	Other.	Landed.	Other.
1862.....	1,844	470	**2,314**	2,247	31	36	1,827	420	17	14
1870.....	1,691	597	**2,288**	2,165	46	77	1,666	499	25	21
1876.....	1,931	850	**2,781**	2,614	62	105	1,898	716	33	29
1879[2] ...	2,209	1,052	**3,261**	3,011	124	126	2,142	869	67	57
1884.....	2,322	1,363	**3,685**	3,378	151	156	2,241	1,137	81	70
1887.....	2,239	1,533	**3,772**	3,439	158	175	2,159	1,280	80	78
1900.....	2,494	2,536	**5,030**	4,502	253	275	2,355	2,147	139	114
1902.....	2,498	2,757	**5,255**	4,698	261	296	2,358	2,340	140	121

[1] Communities, Institutions, etc. The real property included here is all of it considered as »other real property» (than landed). — [2] See the text on page 506.

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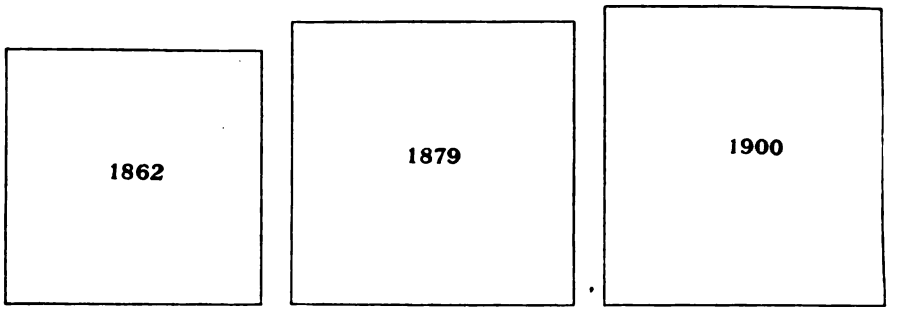
Assessed value of landed property.[1]



1,844 mill. kronor. 2,209 mill. kronor. 2.494 mill. kronor.

these years. Yet, in spite of that decrease, the demand for working people was almost everywhere greater than the supply — a proof of the intensity of the development that had fallen to the country's lot during this period. — Another and no less forcible testimony to that fact is afforded by the assessment figures for income-tax and property-tax and by the estimates of national wealth, to which we now proceed.

Statistics of Taxation in their present condition, date back to 1862. As has been shown in a preceding article in the earlier part of the present work (Chapter on State Finances), triennial, since 1898 quinquennial, official assessments, through the agency of representatives chosen by each community, have been regularly made since that date concerning the value of all *real property* — a difference being always observed between landed property and real property of other descriptions (»other real property»). No calculation, on the other hand, is

TABLE 58. *Total income from real property, capital, and labour.*[2]

Average for the years	Mean population.	A. Five % of the value of real property. Kronor.	B. Income from capital and work. Kronor.	Total. Kronor.	Per inhabitant. Kronor. A.	B.	Total.
1866/70.....	4,166,000	115,977,000	160,427,000	**276,404,000**	28	38	**66**
1871/75.....	4,274,000	121,320,000	225,098,000	**346,418,000**	28	53	**81**
1876/80.....	4,500,000	150,565,000	286,286,000	**436,851,000**	33	64	**97**
1881/85.....	4,605,000	177,271,000	326,976,000	**504,247,000**	38	71	**109**
1886/90.....	4,742,000	192,502,000	368,269,000	**560,771,000**	40	78	**118**
1891/95.....	4,832,000	209,917,000	437,472,000	**647,389,000**	43	91	**134**
1896/00.....	5,032,000	236,689,000	602,125,000	**838,814,000**	47	120	**167**
In 1900.....	5,117,000	251,518,000	715,938,000	**967,456,000**	49	140	**189**
» 1902.....	5,187,000	262,751,000	764,555,000	**1,027,306,000**	51	147	**198**

[1] In 1902 this value amounted to 2,498 million kronor; see Table 57. (A krona = 1·10 shilling = 0·268 dollar). — [2] The income from the real property here supposed to be 5 % of the total assessed value.

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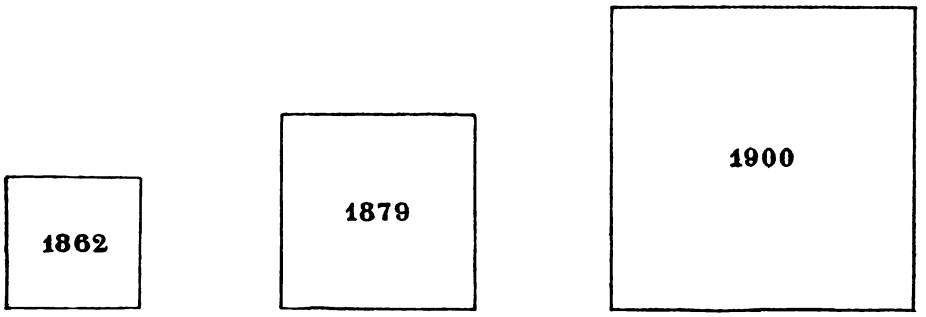
Assessed value of »other real property». [1]



470 mill. kr. 1,052 mill. kronor. 2,536 million kronor.

made as to the pecuniary *profits* that real property brings in to its owners. That is done, however, for the taxable income from *capital and labour*, this assessment being indeed an *annual* one and made by the same authorities as above.

As a consequence of the different modes of procedure just pointed out in assessing, it is impossible to determine the total annual income of the Swedish nation; we have to content ourselves with two sets of figures that do not admit of amalgamation: giving, on the one hand, the *value* of real property, and on the other the *income* derived from movable property (capital), and from service, business or trade (labour).

The results in summarized form are given for both cases in Tables 57—59. In Table 58 an attempt has, moreover, been made at an amalgamation of the figures, inasmuch as the income subject to taxation has been taken together with 5 % of the value of the real property — naturally, in regard to the latter, without any claim to exactness, but merely for the sake of arriving at an approximate idea of the total amount of this item.

TABLE 59. *Specification of income from capital and labour.* In kronor.

Average for the years	Of capital.	Of public service.	Of private service.	Of business or trade.	Total.
1866/70.....	16,831,000	32,617,000	18,162,000	92,817,000	**160,427,000**
1871/75.....	18,227,000	36,953,000	24,079,000	145,839,000	**225,098,000**
1876/80.....	22,343,000	50,564,000	38,418,000	174,961,000	**286,286,000**
1881/85.....	26,050,000	56,871,000	45,538,000	198,517,000	**326,976,000**
1886/90.....	27,138,000	62,863,000	57,893,000	220,375,000	**368,269,000**
1891/95.....	28,545,000	70,577,000	83,741,000	254,609,000	**437,472,000**
1896/00.....	32,915,000	81,892,000	136,604,000	350,714,000	**602,125,000**
In 1900	38,223,000	89,907,000	172,503,000	415,305,000	**715,938,000**
» 1902.....	41,109,000	104,157,000	203,073,000	416,216,000	**764,555,000**

[1] In 1902 this value had increased to an amount of 2,757 million kronor; see Table 57.

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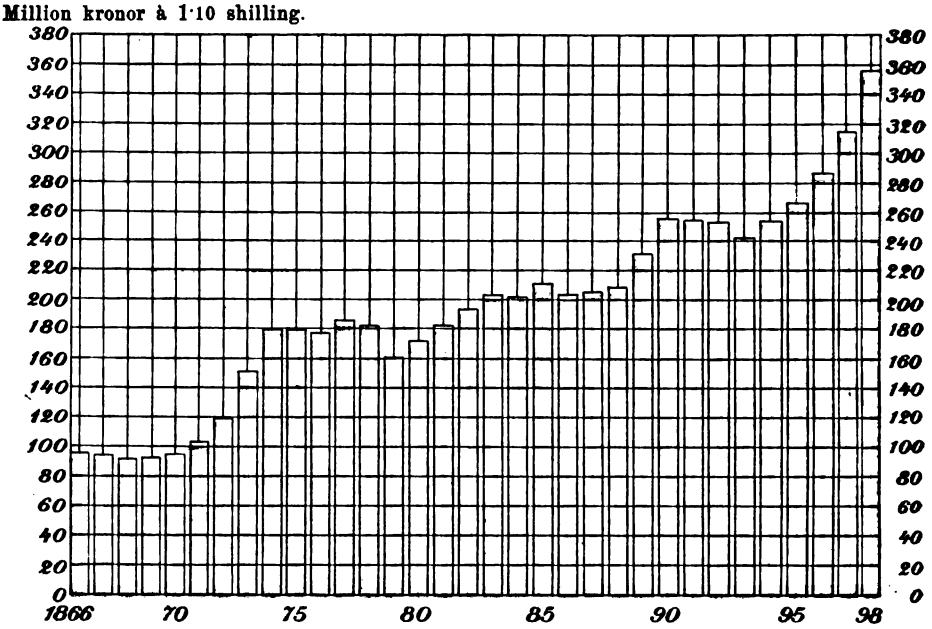
*The assessed Income derived from business or trade.**



The *value* of the whole of the *real property* in Sweden has thus, as we see, increased, between 1862 and 1902, from 2,314 to 5,255 million kronor, or has more than doubled. In agriculture, however, the advance is but from 1,844 to 2,498 millions, or 35 %, an advance which may even, to some extent, be due to a more accurate valuation (from 1879 onwards). In other real property (houses, buildings, factories, and the like) an advance is manifest from 470 to 2,757 million kronor — or nearly 500 %. That the assessment value of real property is, notwithstanding, somewhat lower than the actual one, is shown below.

The Income derived from Capital and Labour proves to have risen since the period 1866/70 from 160 to 765 million kronor — or by nearly 400 %. The income derived especially from *Business or Trade* has swelled from 93 to 416 millions.

This gives evidence of an immense growth during one generation — even if some part of it may be attributed as due to a less accurate assessment in the earlier years of the period. For recent years, we are in a position to obtain a more complete view of the whole matter by means of a valuation of the whole wealth of the country.

* For the years 1899, 1900, 1901 and 1902 the respective figures are 383, 415, 431, and 416 million kronor: see Table 59.

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National Wealth.

The aggregate possessions of a country or of a nation — that is, its so-called national wealth — is the sum of the material property and foreign claims to be found in the possession of the nation and of those forming the nation, upon which both it and they have to subsist.

A calculation, however, of a nation's revenue and wealth is one of the most difficult tasks that statistics can be expected to achieve; and, at the present time, a fully exact statement on this subject is impossible to give. However, even an approximate assessment may be of great interest, as affording a species of »balancing of books» and a stock-taking of a nation's revenues and property as a whole, or to employ another simile, as presenting an instantaneous photograph of them. Moreover, even if the contours in the picture be not quite clear, yet nothing can present so concentrated a view of the economical position of a nation as a complete account of its assets in fixtures and movables, natural products, and products of labour.

The best method of calculating the wealth of a nation is to specify, with as much accuracy as possible, the different subdivisions into which it falls, and then to reckon out the value of each subdivision separately, basing the calculation upon the prices that rule in the purchase or disposal of the properties in question, or, where that is not feasible, to take the net yield, the cost of production, and the value as assured. For a more detailed account of the manner in which the figures have here been arrived at, the reader is referred to: P. FAHLBECK, *Sveriges Nationalförmögenhet* (National Wealth of Sweden), Stockholm 1890, or the *Bulletin de l'Institut international de statistique*, T. VI., 1892.

Following the principles just indicated, we calculate the values of the different heads of national wealth in Sweden for the year 1898 as follows. (A krona = 1·10 shilling = 0·268 dollar).

a) **Landed Property.** Under this heading is embraced land in general, that is, with the exception only of such land as is set apart for, or occupied by building-sites in towns and villages, by factories and railways, etc.; furthermore such buildings as are built upon and belong to estates and also forests and mineral deposits, with the exception of mines and waterfalls. The value of the real landed property subject to these qualifications, was, according to the official assessments (see p. 504), 2,488·5 million kronor, in the year 1898. It ought, however, to be noted that the valuation for the six northern Läns, where forests occupy so prominent a place, is universally acknowledged to have been too low, the total for these districts requiring to be increased by nearly 400 million kronor, according to the estimate of those well qualified to judge. This addition, together with an approximate calculation of the value absorbed by taxes to the State and the local exchequers (capitalized: about 180 million kronor) and with a 50 % increase for the estates belonging to the State in southern Sweden, that are taxed too low, bring the grand total for all the real property in land to about 3,100 million kronor.

b) **Other Real Property.** Under this heading are embraced: houses and sites in towns, villages etc.; further, all other buildings not belonging to landed estates, such as villas, industrial works etc., and waterfalls. The value of property of this description was assessed in the year 1898 at 2,298·7 million kronor, to which is to be added about 50 million kronor, being the capitalized amount absorbed by taxes paid to the State and local exchequers, making a total of 2,348·7

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million kronor. This estimate is, however, too low in one respect, viz.: with reference to the waterfalls in Norrland, which are not even assessed at their present real value but probably several tens of millions of kronor too low — this, altogether irrespective of the rise in value which the future undoubtedly will bring.

c) **Live Stock.** The figures under this heading, arrived at as shown in the above-named publication, are 465 million kronor approximately.

d) **Agricultural Dead Stock.** This is calculated on the basis of the live and dead stock together amounting to a value of 180 kronor for every hectare of cultivated ground. Subtracting from that the value of the live stock, arrived at as above, the remainder of about 163 million kronor will represent the value of the dead stock.

e) **Stock, Machinery and Plant, etc. together with Personal Movable Property.** To calculate these items is a very awkward task and can only be effected with the assistance of the fire-insurance amounts. The complete value of property insured was 6,692 million kronor at the close of 1898. Of this amount the sum for mixed insurance (movable and immovable property together) came to 3,568 million kronor, for movables, separately insured, to 1,107 million kronor, and for immovables, separately insured, to 1,956 million kronor, to which is to be added about 61 million kronor for the insurance of cattle. If the amount of mixed insurance, i. e. for movables and fixtures conjointly, be apportioned in equal shares to each, — a division that previous experience shows to be an approximately correct one — the total amount of insured *movable* property comes to about 2,952 million kronor. Subtracting from this sum the gross value of the live stock and agricultural dead stock, as above obtained (628 million kronor), we obtain for the remaining items, under the heading movable property, the total amount of about 2,324 million kronor.

f) **Mines** and other metalliferous deposits (property in the form of real estate belonging to mines not included). On the basis of the production in 1898 (about 2·3 millions of tons) and at an assumed net price of 2 kronor a ton, the present value of the iron-mines, capitalized at a rate of 6 %, may be reckoned at 76·7 million kronor. To this there may be added 15 million kronor as the approximate value of the remaining metalliferous deposits in working, yielding a total of 91·7 million kronor for this item.

g) **Fisheries and Fishing-Waters,** not included in the assessment of real estate in land, may probably be calculated, on the basis of the yield during recent years (7 million kronor gross), at a capital value of approximately 45 million kronor.

h) **Means of Communication** (roads are excepted as being included under the assessed value of real property). These may be estimated as follows: Canals 15 millions, Railways 715 millions, Tramways 3 millions, Telegraph and Telephone 17·5 millions, Lighthouses 10·2 millions, making a sum of 760·7 million kronor. For the above value of canals, their net yield has been taken and capitalized at 4 %, for railways (yielding interest at the rate of from 4 to 5 % on an average), the total cost of construction, and the same for telephone, telegraph, and lighthouses.

i) **Merchant Navy.** On the following average values per ton: sailing vessels of upwards of 20 tons 80 kronor, steamboats of upwards of 20 tons engaged in foreign carrying trade 250 kronor, engaged in home trade 450 kronor, the total value under this head may be calculated (for 1898) at 99 million kronor, to which comes an additional 5 millions for steam-launches, small sailing-boats and barges, making a grand total of 104 million kronor.

k) **Bullion and Specie.** On the basis of bank reports of Dec. 31, 1898 and of the account published by the Royal Mint of the total amount coined up to the date named, these heads may be valued approximately at 68·5 million kronor.

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l) **Claims on Foreign Countries.** The calculable amount under this head was 98 million kronor at the close of 1898, according to bank reports. Private property in foreign countries in the form of foreign bonds, real property in foreign parts, and claims for freightage cannot be assessed.

m) **Articles that do not enter into the above categories** and that must remain unassessed by reason of want of data, are such movable properties of the State as objects of art, munitions of war, the naval fleet, and fortresses.

Foreign Liabilities. At the close of 1898 the total amount of Sweden's liabilities in the shape of foreign bonds, according to the statements of the respective issuers, was 460 million kronor, and the indebtedness of banks at the same period was 50 millions. To this is to be added the amount of Swedish bills held in foreign countries, probably about equivalent to that of foreign bills in Swedish possession, that is, about 40 million kronor, and also possessions held by foreigners in Sweden to the approximate amount of 20 million kronor. The value of Swedish notes in foreign possession and of foreign claims for freightage do not admit of calculation. Thus, the grand total of liabilities to foreign countries and of the possessions in Sweden of foreigners was 570 million kronor at the close of 1898.

If now the totals under the headings above be compared with those for the year 1885, the result arrived at is shown by the following tabulation:*

	In 1885.	In 1898.
Landed Property	3,092,900,000 kr.	3,100,100,000 kr.
Other Real Property	1,458,500,000 »	2,348,700,000 »
Live Stock	441,000,000 »	465,000,000 »
Agricultural Dead Stock	139,000,000 »	163,000,000 »
Stores, Machinery, Personal Movable Property, etc.	1,380,000,000 »	2,324,000,000 »
Mines and other metalliferous deposits	43,100,000 »	91,700,000 »
Fisheries and Fishing-Waters	36,500,000 »	45,000,000 »
Means of Communication	442,200,000 »	760,700,000 »
The Merchant Navy	79,400,000 »	104,000,000 »
Bullion and Specie	43,700,000 »	68,500,000 »
Claims on Foreign Countries	50,000,000 »	98,000,000 »
Total	7,206,300,000 kr.	9,568,700,000 kr.
Deductions for Foreign Liabilities	664,000,000 »	570,000,000 »
Surplus	**6,542,300,000** kr.	8,998,700,000 kr.

Hence, in the space of these thirteen years the national wealth has increased from 6,542 million kronor to 8,999 million kronor; or by a sum of 2,457 million kronor. As the population of Sweden at the close of 1885 was 4,683,000 and at that of 1898 was 5,063,000, the amount of wealth per individual works out at 1,397 kronor in the first case and at 1,777 in the second.

This forms undoubtedly a very considerable increase for comparatively so short a period. Specially noteworthy is the enormous rise in the value of movable property, under which heading are embraced both wares for consumption and movable capital (in the form of stores, machinery, specie etc.). Of real property again, buildings, factories etc. (real property not in land) have increased in value very much, while

* A krona = 1·10 shilling or 0·268 dollar.

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real property in land has remained stationary, the latter circumstance an after-effect of the prolonged crisis in agriculture, the former, on the other hand, an incontestable proof of the development of industry during this period and of the constant augmentation of capital. Worthy of notice are, too, the increase in the claims on foreign countries and the decrease of foreign liabilities, which are to be explained: firstly, by the circumstance that the Post-office savings-banks, instituted in 1884, have bought up very considerable amounts of Swedish bonds from abroad, and secondly, by the State having latterly constructed railways with the aid of money raised by taxes instead of, as in earlier times, by foreign loans — both these circumstances being yet further proofs of the great accumulation of capital during the period.

However great the increase of capital in Sweden has been during the last few years and still is, yet it does not suffice to meet the requirement, which increases at a still more rapid rate. The new spirit of enterprise that has taken hold of the people of the country is in need of a larger supply of the sinews of industry than it possesses or is able to create at a moment's notice, in order that the riches that still lie fettered in the heart of the rocks or run to waste in the waterfalls of the country may come to profitable use.

Thus, it will be necessary for Sweden for some time still to increase its working capital from other countries, more favourably situated in that regard, if her natural resources are to be properly looked after. But if that comes about in such a way that what is at present being used but to a small extent or not at all has been rendered accessible and productive, then the appellative *poor*, often used in reference to the country will have to be exchanged for *rich*, an alteration, indeed, that is in a measure already justified.

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VI.

AGRICULTURE AND CATTLE-BREEDING.

In the preceding pages it has been shown that agriculture and cattle-breeding still, in our days, give a living to 55 %, or more than half of the population of Sweden, and that thus these branches of industry, if regarded from this point of view, are of, at least, as great importance as all the others together. Of all the countries of Western Europe, agriculture may, relatively speaking, only in the neighbouring countries of Denmark and Finland, play a greater rôle than it does in Sweden.

As early as almost a thousand years ago, the inhabited districts of Central and Southern Sweden extended over about the same ground as in our days; which is seen by the fact that the greater part of the villages and farms in these parts of the country have names derived from pre-christian times. This fact does not, however, signify that the extent of cultivated ground should be nearly unchanged; on the contrary, this has been considerably increased during the course of time, especially so during the century which has just come to an end.

From a technical point of view, the agriculture of Sweden, regarded as a whole, developed itself as early as during the middle-ages (with the monks, principally, as teachers) to the point it subsequently retained into the 19th century. During the so-called »Era of Liberty» (1718/72), a time in our country so rich in new ideas and experiences, much attention was certainly paid to improvements in agriculture also, and there flourished a specially rich literature upon the subject; nay, Sweden produced at that time the real originator af agricultural chemistry, *J. G. Wallerius*. But the pecuniary sacrifices were really made to mechanical industries and mining, and agriculture was never at that time regarded as capable of giving any greater amount of economic gain. So the new departures stayed entirely amongst persons of quality, and never reached the peasantry, who possessed neither time nor ability to draw any advantage from them. The peculiar parceling of the land then prevailing in reality rendered all great improvements impossible too.

The new period in Swedish agriculture can be reckoned only from the introduction of the »**re-parceling**», a step towards which was really made in the middle of the 18th century, but which was not completed until in our century. The old division of land was not an unfavourable one from the point of view that it should be in the hands of only a few; on the contrary, it has always been a distinguishing feature in Sweden that the greater part of the land was possessed by a considerable number of small farmers; the only important excep-

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tions to this rule have occurred in certain districts, especially in Skåne, which for a long time belonged to Denmark. But the disadvantage lay in the manner in which the possessions of every farm were situated. The lots were small and numerous; instances were found where, in a single village, there were 5,600 lots divided amongst a total of only 20 owners. The cultivated land of every village was divided into several fields, and in every field each of the part-owners of the village had his share, his plot, or »*teg*», as it was called. These plots were long and narrow strips, often so narrow that a cart could not be turned without coming into a neighbour's plot. Quite naturally the consequence was that cultivation was much impeded. As the plots could not be separated by fences, all the peasants in the village were obliged simultaneously to sow and reap and have their cattle out at pasture. The mutual obligations and rights of the neighbours had to be ordered by a number of very detailed laws, which quite naturally gave birth to dissensions and difficulties, and which annihilated all attempts of individual owners to improve the cultivation of their land.

To remedy these inconveniences, regulations were issued in 1749, 1757, and 1762, respecting the »**General re-parceling of land**» (Storskifte), by which the number of land-parcels should be reduced to, at the most, four for arable fields, four for meadows, and one for woods, or nine, at the most, for every farm. A landowner *could* even, in certain cases, get his land entirely separated and made into one compact lot. But these regulations (which, besides, were not carried out in Dalarne and the mining districts) did not, as a rule, completely remove plotparceling with its disadvantages, amongst which one of the greatest was the impossibility for the individual land-owner to change from the established biennial or triennial rotation of crops.

But when *Mr. Maclean*, a landed proprietor at Svaneholm in Skåne, in the decade 1780/90, divided his estate of 3,400 hectares, so that 73 leasehold farms and 6 outlying farms were detached from the chief estate, and introduced rotation of crops, the results were so convincing that »**Separate-parceling**» (Enskifte), or the right for the individual to have his land in one coherent lot, was made possible by the regulations of 1803, 1804, 1807, and 1812. But it was only in the year 1827 that this step was completed by the introduction of »**Legal parceling**» (Laga skifte). As soon as *one* land-owner in a village insisted on his right, all were now obliged to submit to re-parceling of the land, and each owner should then receive his reclaimed land (arable and meadow) as far as possible in one lot, even if, for that purpose, villagers should be compelled to move from their old homesteads. The land was graded according to its quality, so that the one who received land of inferior quality obtained, on the other hand, so much the more of it.

The regulations regarding re-parceling of the land awakened in many places so great discontent that the surveyors were sometimes obliged to carry loaded pistols to protect themselves, and as to the island of Gotland the Government found itself obliged to withdraw the regulations respecting legal parceling, in consequence of which these came into force there only in the decade 1870/80, while, in other parts of the country most of the re-parceling was carried out during the years 1830/40 and 1840/50. The great work was at last almost perfectly completed. At the present time, the regulations concerning the parceling of the land have been carried out in respect to about 70 % of the kingdom of Sweden, and remains to be done but for about 5 %, re-parceling of the remaining 25 % being considered as uncalled for of necessity. The commencement of the modern Swedish agriculture may be dated from about the period 1840/50.

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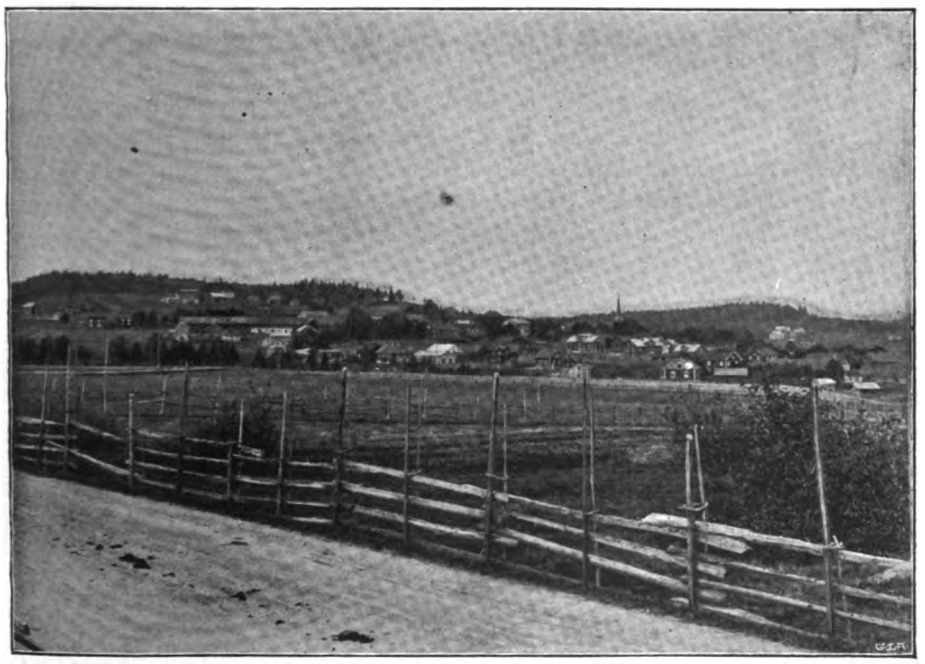
1. AGRICULTURE.

Modern agriculture begins, as is well known, with the more general application of the principles and methods of a rational agriculture, and has, as its first assumptions, the higher development of agricultural chemistry (Berzelius' and Liebig's works) and that of the physiology of plants. Besides this are included the development of technical machinery — which was partly rendered necessary by the increased cost of human labour in consequence of immigration to the towns as well as by the development of industry — and also the new forms of agricultural credit, by which the possibility of obtaining the necessary working-capital was considerably increased. The capacity of the people in general to understand and utilize the principles of a rational system of agriculture has, too, been continually on the increase in Sweden during the last half-century. The agricultural literature of Sweden during the 19th century has not, it is true, been of as much importance for its epoch as that of the 18th century was for its time, but it has become of far greater utility for the *people* as a whole, in consequence of the great increase in popular instruction.

Two **principal periods** can be distinguished in the development of modern Swedish agriculture — that is, since 1840.



A Swedish Village (Karlskoga, Örebro län).

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A) Until about 1870 the **production of cereals** was the chief concern. This was furthered by an easier access than formerly to capital, and the consequent reclaiming of waste grounds as a result of the high prices of corn, especially during and after the Crimean war, and the lucrative export of oats to England (prices being 30 % higher than for the present), and was made possible by the employment of better machinery which rendered more accessible the nutritive substances of the soil; by means of better draining, which has the same result; and, in the southern part of the country, by means of marling, which indeed gave the soil a certain quantity of nutritive substances but became still more effective by means of dissolving and bringing into use the mould-elements of the earth; finally, in an essential degree, by the consequences of the »re-parceling» previously mentioned, which took place chiefly during the period 1830/55. Towards the decade 1861/70 much energy was shown too, in the export of fattened cattle to England.

B) From the decade 1871/80, Swedish agriculture entered in a short time upon a new face. More weight began to be generally laid upon manuring on a large scale, by means both of artificial manures and by a transition to **cattle-rearing** and, in connection therewith, such employment of its products that the nutritive materials of plants taken from the soil were returned to it in the form of manure. When it was soon found that cattle-rearing in union with dairy-farming could be *directly* more lucrative than the growing of cereals, the number of cattle was more and more increased, as well as was the feed and the use of artificial fertilizers, the result of which was the export of butter and meat. The export of butter has continually increased (till some few years back), while that of meat has now declined. The external cause of this is that the export of pigs and cattle, first to England and then to Germany, has been rendered almost impossible by the prohibition of the import, and by severe legal enactments. — Facilitated communication and the competition of distant countries which has thus become possible in the market of cereals, and the depression in the price of cereals, have afterwards further contributed to the restriction of the export of these products.

The price of land has, as a rule (except in Skåne), accommodated itself to the price of cereals. Thus, in 1853/56, it rose greatly, but afterwards remained almost stationary until the commencement of the seventies when, for some years, a great but brief increase took place; it remained afterwards unchanged until the beginning of the decade 1881/90, but then made a decided decline until 1890 à 1893, after which an unimportant rise was noticeable. At present it is considerably lower than in the middle of the seventies. The fall in the price of land was greater in the upper, corn-producing part of Sweden than in Skåne, which produces milk, butter, and beets on a large scale. The transition from free-trade to protection (in 1888) was, in Sweden as in many other countries, a result of the fall in the price of cereals in the markets of the world.

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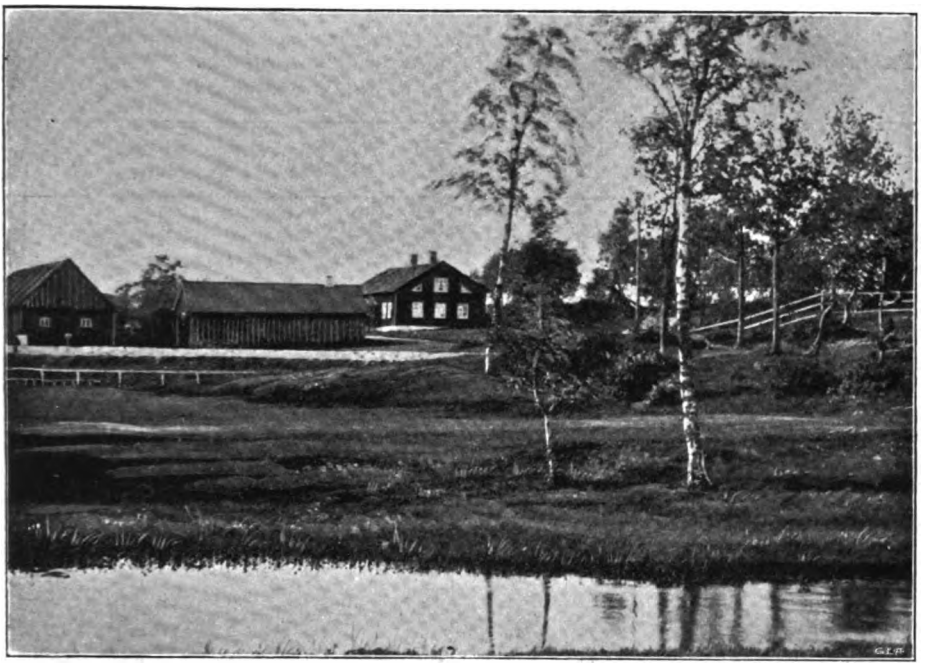

A Swedish peasant farm. (*North Skåne*).

Method of Cultivation. In many places on large farms, a regular rotation of crops was introduced as early as the end of the 18th century, but even to the beginning of the decade 1851/60 the peasants regularly employed the biennial and the triennial systems, and it was seldom that ploughed land was used for fodder plants. Since then, the system of rotation of crops has become more general even upon small farms and it is now the rule. By this system the farm is divided into 4 to 10 parcels which alternately bear cereal, root, and grass-crops, and usually lie fallow one year of the period of rotation; the rule is also that only two ripe corn-crops, at the most, are taken one after the other. In the following section upon Root-crops, an account is given of the great importance the cultivation of the sugar-beet has had for the farming in the southern part of Sweden of late years.

Oxen were formerly the *draught-beasts* chiefly in use in Central and Southern Sweden but their number has more and more diminished, to be replaced by horses, which are more suitable for the thorough cultivation of the land.

Subsoil-Draining commenced to be used before 1850 and has since made constant progress, but most actively so in good times and of late years, until the price of labour began to prove restrictive in this, as in so many other cases. Common draining-tiles are generally used as filling materials; in certain districts cobble-stones, and upon moor-ground, here and there, brushwood or fencing.

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TABLE 60. *Imports and exports of agricultural products.*
Value in thousands of kronor à 1·10 shilling or 0·268 dollar.

Products.		Average 1871/75.	Average 1876/80.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1900.
Unground corn	Imp.	9,725	18,158	30,395	20,491	26,551	31,855	42,064
	Exp.	35,934	38,309	27,130	17,365	14,773	3,382	1,370
Flour	Imp.	9,467	13,582	10,429	7,843	5,928	2,542	2,651
	Exp.	873	823	1,695	990	251	485	706
Other agricult. products	Imp.	2,539	2,757	2,846	3,214	3,598	8,868	11,220
	Exp.	109	238	337	236	220	276	92
Live stock	Imp.	610	939	1,421	1,169	795	1,126	1,269
	Exp.	6,867	6,432	8,752	8,815	5,059	3,046	1,413
Meat, pork, sausage	Imp.	6,985	10,141	8,285	6,008	4,983	6,112	8,283
	Exp.	285	190	548	3,386	6,161	2,413	1,291
Butter and margarin	Imp.	2,395	3,554	4,054	3,333	1,943	1,768	1,136
	Exp.	6,098	8,540	15,202	25,438	38,323	40,491	36,803
Wool	Imp.	6,320	4,486	5,428	6,874	4,820	7,332	9,859
	Exp.	86	48	81	87	49	111	148
Hides, untanned	Imp.	6,343	2,957	3,697	2,991	2,611	5,036	5,555
	Exp.	650	593	753	1,096	1,288	3,174	4,350
Other cattle-farming products	Imp.	2,199	2,708	2,812	1,960	1,998	4,528	6,995
	Exp.	575	425	627	953	857	533	335
Total	**Import**	**46,583**	**59,282**	**69,367**	**53,883**	**53,227**	**69,167**	**89,032**
	Export	**51,477**	**55,598**	**55,125**	**58,366**	**66,981**	**53,911**	**46,508**

One of the most important improvements, however, in the farming-system is the greatly increased and varied *manuring*. Together with the natural manure (farmyard-dung and night-soil) which has been employed from olden times, sea-weed is used in many coast districts. In the beginning of the decade 1851/60, the use of lime, ground bone, and guano, phosphoric acid, and nitrogene began to spread; then pudrette with lime (commonly now mosslitter) came into vogue, too, but it was not till the decade beginning 1871 that artificial manuring came into more general use, after the most fertile districts of Sweden had seen its necessity. The manufacture and import of *artificial manures* of late years have amounted as follows, in quintals:[1]

Averages.	Production. Quintals.	Imports. Quintals.	Exports. Quintals.	Consumption.[2] Quintals.
1876/80	96,222	284,382	9,720	370,884
1881/85	301,372	430,885	30,412	638,286
1886/90	446,224	682,734	19,306	955,412
1891/95	692,255	1,093,577	44,900	1,482,475
1896/00	1,143,258	1,553,372	33,120	2,398,324
In 1900	1,288,065	1,495,504	1,251	2,531,320

[1] A quintal = 1·97 cwts. — [2] From 1885 (inclusive) with subtraction of imports of raw phosphate consumed for the home production of superphosphate. For 1876/84, such subtraction cannot be made, in consequence of which the above figures are too high for these years.

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The climate considerably restricts the period of cultivation the more one comes towards the north. In the greater part of Sweden it is considerably shorter than in Denmark and Germany, and in Northern Sweden the labourers can be employed in farming for but four months yearly, and must consequently have other employment for the greater part of the year.

As a **general verdict** upon the state of modern Swedish agriculture it may be said, that it has adopted, to a larger or smaller extent, almost all the inventions, both theoretical and practical, which have been successfully tried in other countries, but that in consequence of the great extent of the country, the differences in its soil, and the remote situation of many districts, primitive methods and machinery are still found side by side with even the very newest. The agriculture of Skåne and of Southern Halland is, in general, of a very high standard, but also in the rest of Sweden the modern farmer displays a pleasing wakefulness. Small farmers establish societies for the purchase of manure. Great attention is paid to seed with the help of controlling-stations, chemical stations, and purchase-societies. Horse-rapes, reaping-, and sowing-machines have come into use even on small farms. Steam threshing-machines are often purchased by several farmers together and are used by them in turn. Those farmers who have passed through an agricultural institute or a farming-school, are usually able themselves to carry out necessary levelings, lay out a draining-scheme, or map out a field; they can follow, pretty nearly at least, the developments recorded in agricultural journals and magazines, and they have opportunities, at larger and smaller agricultural shows, to become acquainted with the technical progress of their profession. Independent scientific investigations are also made in many branches, in our country, such as at the Experimental Grounds of the Academy of Agriculture, and at the Agricultural High Schools, at the trial fields of the Fen-culture society and of the General Swedish Sowing-seed Society; Sweden also nowadays takes part in the foremost work of modern research, both respecting agricultural chemistry and the bacteriological examination of the diseases of cultivated plants.

The figures in Table 60 also bear witness, to a certain degree, of the development of Swedish agriculture of late years; figures which give the total value of the **imports and exports** of agricultural produce, whether derived from farming proper or from cattle-rearing. The total values, of both imports and exports, calculated in kronor, are as follows (a krona = 1·10 shilling = 0·268 dollar):

Averages.	Imports.	Exports.	Excess of Exports.
Years 1871/75	46,583,000	51,477,000	+ 4,894,000
» 1876/80	59,282,000	55,598,000	— 3,684,000
» 1881/85	69,367,000	55,125,000	— 14,242,000
» 1886/90	53,883,000	58,366,000	+ 4,483,000
» 1891/95	53,227,000	66,981,000	+ 13,754,000
» 1896/00	69,167,000	53,911,000	— 15,256,000

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That the increase of exports is not greater than what is shown here depends, in the first place, upon the great increase of the home-consumption. We need only remember that in 1870 but 28 % of the population of Sweden was engaged in other than farming pursuits; in 1900 this proportion of the population, which, of course, also demands its share of the produce of agriculture, had risen to 45 %. In addition to this, there is the considerably increased consumption per head, of which mention was previously made, and of which Tab. 30, p. 156, bears witness in respect to some of the most important articles.

On the other hand, it cannot be denied that a further increase of the export of agricultural produce is not only possible, but is also necessary for the sound economy of the country. The last few years have not been very favourable in this respect. The failure of both the oat and potato crop in 1899 also contributed to the bad result for the year 1900 when the imports rose to 89 million kronor, while the exports reached but 47 millions.

If we take into account the amount of the imports and exports given above which belong to *farming* proper — that is, apart from the products of cattle-rearing — the result will be as follows, in kronor:

Averages.	Imports.	Exports.	Excess of Exports.
Years 1871/75	21,731,000	36,916,000	+ 15,185,000
» 1876/80	34,497,000	39,370,000	+ 4,873,000
» 1881/85	43,670,000	29,162,000	— 14,508,000
» 1886/90	31,548,000	18,591,000	— 12,957,000
» 1891/95	36,077,000	15,244,000	— 20,833,000
» 1896/00	43,265,000	4,143,000	— 39,122,000

Here are clearly shown the results of the more restricted rôle which has been filled, during the last twenty or thirty years, by the cultivation of cereals as compared with cattle-rearing — a distinguishing feature, during the period, not only of Swedish but also of European agriculture in general.

Number and dimensions of Farms.

The total number of farms amounted in 1900 to 338,416, so that each farm corresponded to about 10 hectares of cultivated land.[1] About 23 % of the farms has but 2 hectares or less; 66 % possessed between 2 and 20 hectares, and 10 % between 20 and 100 hectares. Somewhat more than 3,000 farms (1 % of the whole number) each embraced more than 100 hectares of cultivated ground. Since the decade 1841/50, the number of large farms has increased by the purchasing of several peasant-farms and placing them under common farming. During the last few years a tendency has, however, displayed itself once more to break up the large estates into small farms. In Norrland the number of independent

[1] An hectare = 2·47 acres.

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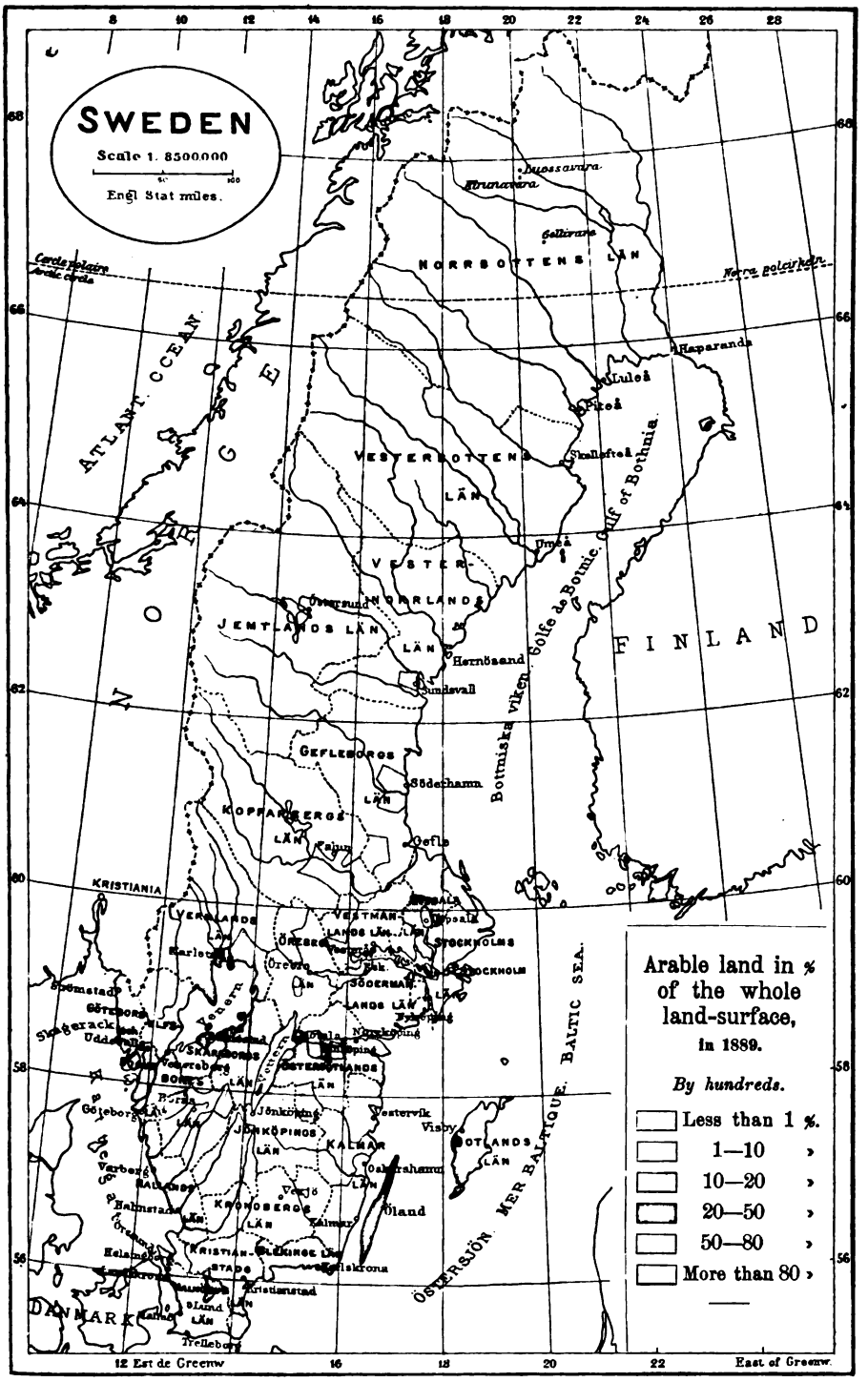

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peasants has diminished for several decades in consequence of the purchase of farms by saw-mill companies, for cutting down the timber, after which the cultivated ground is turned into pasture, etc. or is let to the former owner. Nowadays the wood-land can be sold separately, but the owner of such a farm without wood-land often finds himself in a very difficult position. — Some of the chief data respecting the farms from the point of view of *right of possession* are given in the chapter upon social conditions.

Of the whole number of farms in Sweden in 1900, only 15 % were farmed by **tenants**. Amongst the smaller farms (up to twenty hectares of cultivated ground) but 13 % were held by tenants; amongst the middle-sized farms, again, 30 %, and amongst the larger (exceeding 100 hectares of cultivated ground), as much as 37 %. This clearly shows that the farms held on lease are, *on an average*, larger than those farmed by the owners themselves. The rent is almost always paid in cash. Some details of the legislation upon this matter are given below under the division Agricultural legislation.

In 1900 there was a total of 167,452 *crofters' allotments* and other *small holdings* not belonging to the number of farms proper.

The extent of cultivated land

in Sweden at the present time is shown by Tab. 61. More precisely stated it amounted in 1900 to 3,557,542 hectares, of which 37,661 hectares were garden land and 3,519,881 hectares under farming. In addition to this there were 1,460,504 hectares of natural meadow-land, including which the total area used for agriculture in Sweden amounts in round numbers to 5 million hectares. (An hectare = 2·47 acres).

The extent of cultivated land alone (that is, apart from the natural meadow-land) amounts to 8·6 % of the area of the land-surface of the country, but the variations are immense, as is shown by Tab. 61, even between the different Läns, among which the Malmöhus is cultivated to an extent of 73·9 % of its whole area, while the immense Län of Norrbotten remains at but 0·4 %. Still greater differences appear between smaller districts, as shown by the map on page 519. In the most northern hundred of Sweden, the amount of cultivated land scarcely exceeds one ten-thousandth part of the total area, while in the most southern hundreds, it amounts to 90 % and more.

The figures given on the area of arable land in Sweden in olden times are very uncertain. Still, it is not improbable that during the nineteenth century this area has been *quadrupled*, a result which is, beyond all doubt, much to the credit of Swedish agriculture. Part of the reclaimed land has been taken from the area of natural meadow, but also to a great extent from forest-land or from land previously

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TABLE 61. *The distribution of the area by Läns, in 1900.*
(A sq. kilometer = 247 acres or 0·386 sq. mile).

Läns.	Entire *land* area. Sq. km.	Whereof in sq. kilometers.				In % of area.			
		Cultivated land.	Natural meadow.	Woods.	Other land.	Cultivated land.	Meadow.	Woods.	Other land.
Stockholm	7,475	1,665	326	4,081	1,403	22·3	4·4	54·6	18·7
Uppsala	5,121	1,483	383	2,793	462	29·0	7·5	54·5	9·0
Södermanland	6,271	1,691	124	2,848	1,608	27·0	2·0	45·4	25·6
Östergötland	9,969	2,429	624	6,176	740	24·4	6·2	62·0	7·4
Jönköping	10,616	1,300	1,633	4,037	3,646	12·3	15·4	38·0	34·3
Kronoberg	8,907	868	1,113	2,517	4,409	9·7	12·5	28·3	49·5
Kalmar	10,962	1,682	733	5,569	2,978	15·3	6·7	50·8	27·2
Gotland	3,117	653	320	1,373	771	21·0	10·3	44·0	24·7
Blekinge	2,896	647	173	1,154	922	22·3	6·0	39·9	31·8
Kristianstad	6,222	2,293	526	2,064	1,339	36·8	8·5	33·2	21·5
Malmöhus	4,729	3,495	237	650	347	73·9	5·0	13·8	7·3
Halland	4,771	1,364	278	784	2,345	28·6	5·8	16·4	49·2
Göteborg o. Bohus	4,895	1,011	115	1,166	2,603	20·7	2·3	23·8	53·2
Elfsborg	11,828	2,146	579	6,005	3,098	18·1	4·9	50·8	26·2
Skaraborg	8,075	3,264	413	3,027	1,371	40·4	5·1	37·5	17·0
Vermland	17,550	2,047	451	13,632	1,420	11·7	2·6	77·6	8·1
Örebro	8,318	1,538	325	5,211	1,244	18·5	3·9	62·6	15·0
Vestmanland	6,434	1,537	227	3,436	1,234	23·9	3·5	53·4	19·2
Kopparberg	28,150	1,015	960	20,724	5,451	3·6	3·4	73·6	19·4
Gefleborg	18,314	1,006	777	14,948	1,583	5·5	4·2	81·6	8·7
Vesternorrland	24,128	804	452	20,043	2,829	3·3	1·9	83·1	11·7
Jemtland	47,512	521	409	29,480	17,102	1·1	0·9	62·0	36·0
Vesterbotten	55,769	757	1,710	26,110	27,192	1·4	3·1	46·8	48·7
Norrbotten	99,166	359	1,717	29,243	67,847	0·4	1·7	29·5	68·4
Entire kingdom	411,195	35,575	14,605	207,071	153,944	8·6	3·6	50·4	37·4

entirely waste, by the draining of low districts, the cultivation of fen-lands, and by the tapping of lakes. Of late years the State has granted cultivation-loans very extensively (for this, the reader is referred to the special division in the pages following). A special account is also given in the following pages of the great activity nowadays displayed by the Swedish Fen-culture society.

The division of cultivated ground with respect to the chief kinds of crops produced is seen, for the years 1870 and 1900, from the following figures:

	In 1870. Hectares.	In 1900. Hectares.	Per cent. *1870.*	*1900.*
Cereals	1,294,000	1,707,313	50·8	48·5
Fodder plants	690,000	1,190,226	27·1	33·8
Roots	154,000	203,575	6·0	5·8
Fallow	388,000	413,906	15·3	11·8
Other plants than above	21,000	4,861	0·8	0·1
Total	2,547,000	3,519,881	100·0	100·0

The figures for 1870 given above are certainly somewhat too low. To obtain the total area of cultivated ground, we must besides add the area of garden-land, estimated in 1870 at 26,397 hectares (too low a figure), and in 1900 at 37,661 hectares.

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The Cultivation of Cereals.

A) **Total Production.** How greatly the total production of cereals has increased in Sweden during the 19th century appears from Table 64 and the diagram on page 526. For every inhabitant there were annually produced during 1801/20 but 272 kilograms of corn, during the years 1891/00, on the contrary, 475 kilograms. The last-named figure is comparatively high, inasmuch as the average for Western Europe amounts only to 300 kg., and even for the richly corn-producing Eastern Europe scarcely more than about 500 kg. or about the same as in Sweden. The whole corn-harvest of Sweden in 1801/20 was 6·62 million quintals annually; in 1891/1900, on the contrary, 23·48 millions (or 46 million cwts). These figures become so much the more important when we remember that during this time a larger and larger part of the land was taken for the cultivation of root- and green-crops.

During the period 1841/80 Sweden was a corn-*exporting* country (see Table 64). Both before and since that time the *import* has been in the excess. (As an historical fact, it may, however, be mentioned that at certain times during the 16th and 17th centuries, Sweden was in a position to export cereals). The *consumption* (even after deduction for seed) has increased enormously, from 5·77 mill. quintals annually in 1801/20 to 21·98 millions annually in 1891/00, or, per inhabitant, from 237 to 446 kilograms (cf. Table 65, p. 526).

The whole *area sown* with cereals must have amounted, at the beginning of the 19th century, to somewhat more than 500,000 hectares. At the middle of the century these figures had reached to at least 900,000 hectares, and, at its close, to 1,700,000 hectares (or 4,200,000 acres).

B) **The different kinds of cereals.** The diagram on page 527 shows in what proportions the different principal kinds of cereals formed part of the harvest in olden times as compared with these proportions in our own days. Three hundred years ago *barley* was the predominant cereal, but it now plays a comparatively less important

TABLE 62. *Areas under Cereal Crops. 1801/1900. Hectares (à 2·47 acres).*

Average for the years	Total.	Wheat.	Rye.	Barley.	Oats.	Mixed Corn.	Leguminosæ.
1801/20	552,150	15,150	180,000	161,000	113,500	57,500	25,000
1821/40	724,300	21,800	236,000	187,500	152,000	82,000	45,000
1841/60	911,000	33,250	292,500	210,000	226,500	93,750	55,000
1861/80	1,289,926	58,243	355,051	225,196	516,053	80,383	55,000
1881/90	1,565,992	72,899	380,665	225,517	734,956	95,465	56,490
1891/95	1,676,325	77,510	394,401	220,642	813,201	117,587	52,984
1896/00	1,699,204	80,844	403,053	219,329	818,378	126,849	48,751
In 1900	1,707,313	84,762	404,135	217,561	821,051	133,618	46,186

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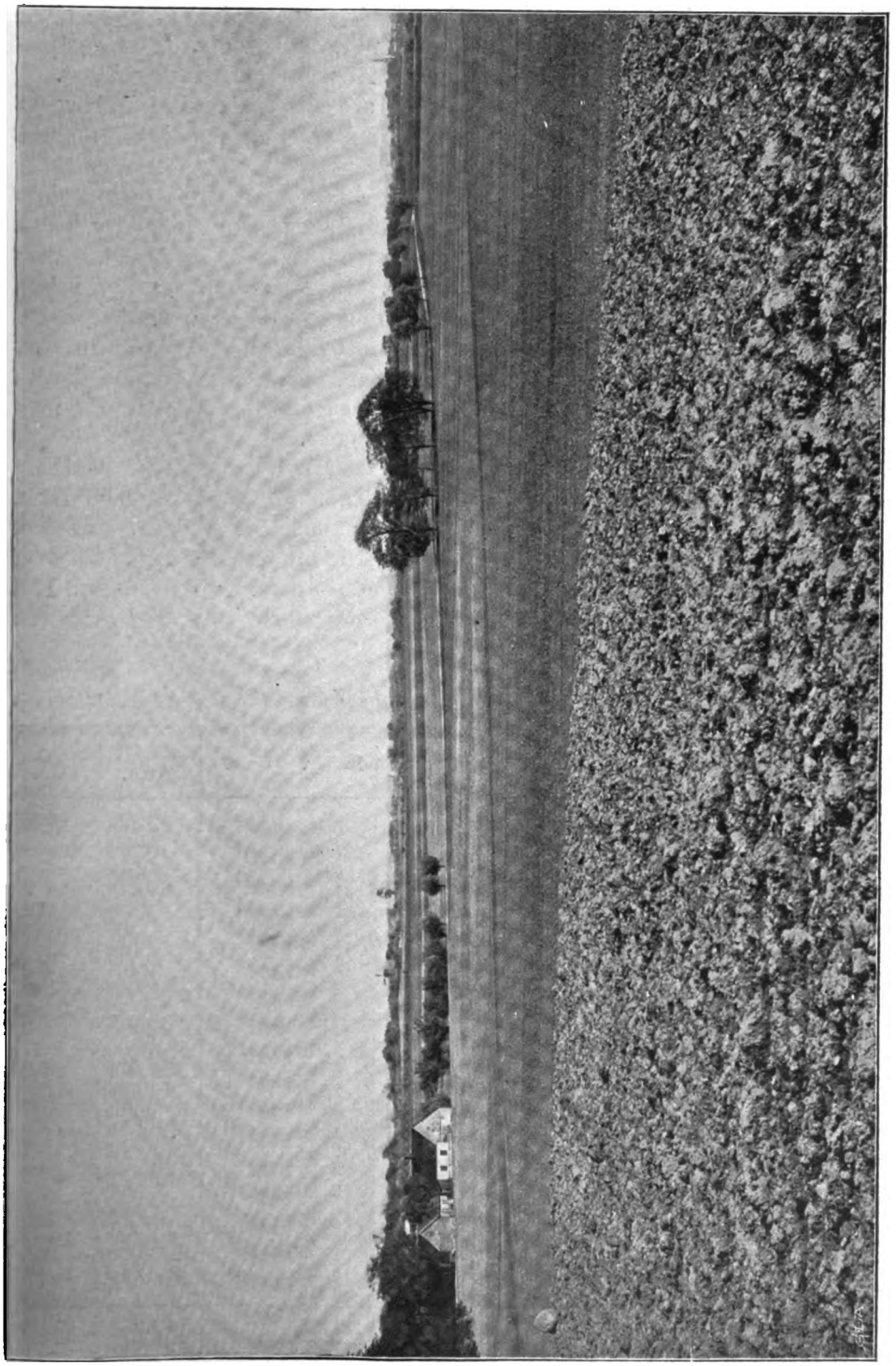

Landscape near Alnarp in Skåne.

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rôle (excepting in Northern Sweden); *wheat*, on the contrary, has gained ground, which more especially has taken place with *oats*. The cultivation of *rye* has changed its relative proportion comparatively least.

Besides the above-named crops, there are also cultivated in Sweden mixed corn, peas, beans, and vetches, and a scarcely appreciable amount of buck-wheat.

The crops produced of the various cereals during different periods are shown by Table 66 and those for each Län in our days by Table 67. On the whole, Sweden can be said to be divided, in the question of cereal-cultivation, into three **regions.** In Norrland, barley is the predominant crop, and that in a higher degree the more to the north one comes. Central and Southern Sweden, again, are divided into an eastern half, with a large cultivation of rye, and a western half, with a still greater cultivation of oats. An idea of these conditions may be gained from the maps on pages 530 and 534.

An important rôle is played in our farming by our most southern province Skåne. It may be seen from Table 67 that its two Läns, Malmöhus and Kristianstad, which occupy but 2½ % of the area of Sweden, produce 30 % of all our wheat, 18 % of our rye, 33 % of the barley-crop of the country, and 13 % of its oats. No less than 17 % of the total monetary value of all the crops of Sweden, or quite one sixth, belongs to these two Läns.

TABLE 63. *Area under cereal Crops, in 1892, by Läns. Hectares (à 2·47 acres).*

Läns.	Total.	Wheat.	Rye.	Barley.	Oats.	Mixed Corn.	Leguminosæ.
Stockholm	**71,966**	6,858	18,199	5,916	28,796	6,709	5,488
Uppsala	**65,827**	5,774	15,632	11,803	23,204	5,896	3,518
Södermanland	**75,448**	6,278	17,540	3,654	39,799	4,572	3,605
Östergötland	**126,147**	7,983	29,414	11,670	41,610	27,272	8,198
Jönköping	**67,798**	667	19,377	3,983	42,012	830	929
Kronoberg	**55,478**	26	13,977	9,264	31,698	196	317
Kalmar	**87,217**	3,761	31,763	12,917	36,603	582	1,591
Gotland	**29,380**	4,814	10,111	10,563	2,027	1,401	464
Blekinge	**38,844**	1,500	16,211	3,373	15,921	1,097	742
Kristianstad	**116,129**	4,660	34,084	16,266	39,730	18,199	3,190
Malmöhus	**182,167**	15,050	31,638	44,059	51,973	32,882	6,565
Halland	**73,171**	2,630	18,022	3,919	43,869	3,460	1,271
Göteborg och Bohus	**57,792**	970	9,556	5,328	37,737	1,071	3,130
Elfsborg	**99,448**	1,486	18,608	2,186	74,121	1,003	2,044
Skaraborg	**159,343**	5,563	37,925	3,844	105,099	1,750	5,162
Vermland	**92,106**	838	24,084	1,290	64,311	573	1,010
Örebro	**66,376**	3,617	15,464	2,317	42,275	946	1,757
Vestmanland	**65,297**	4,941	15,308	3,536	37,477	1,416	2,619
Kopparberg	**44,675**	544	9,614	3,506	26,807	3,421	783
Gefleborg	**30,426**	69	2,875	10,330	15,680	922	550
Vesternorrland	**24,913**	.	2,039	16,968	5,042	605	259
Jemtland	**10,739**	.	576	7,494	1,632	229	808
Vesterbottten	**18,258**	.	787	15,550	1,706	215	—
Norrbotten	**14,699**	.	427	12,647	1,625	.	—
Total 1892	**1,673,644**	**78,029**	**393,231**	**222,383**	**810,754**	**115,247**	**54,000**
Id. 1900	**1,707,313**	**84,762**	**404,135**	**217,561**	**821,051**	**133,618**	**46,186**

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Next to Skåne our most important cereal districts are the plains surrounding the great lakes of Central Sweden, occupying larger or smaller parts of the Läns of Uppsala, Vestmanland, Södermanland, Örebro, Östergötland, and Skaraborg — together with the two islands of Gotland and Öland.

Sweden produced, on an average for the years 1891/95, **per every head of the inhabitants,** the following quantities, in kilograms, of the principal kinds of cereals; a comparison with some other countries is also made.

	Wheat.	Rye.	Barley.	Oats.	Total.
Sweden	24	116	65	229	**434**
Great Britain and Ireland	42	1	45	77	**165**
The German Empire	73	153	55	115	**396**
France	211	45	29	106	**391**
Western Europe	95	62	41	78	**276**
Eastern Europe	115	141	54	79	**389**
United States of America	213	11	26	157	**407**

As regards all these kinds of corn, Sweden's production may be considered as relatively pretty high, with the single exception of wheat, the cultivation of which is confined by climatic conditions to the central and southern parts of the country.

Seed is sown pretty thickly in Sweden as a rule, as is generally the case in Northern Europe. Rye is an exception to this in certain parts of Sweden, being sown very thinly in Northern Sweden, Finnish stove-dried seed being used. Reckoning in hectoliters, there are sown on an average in Sweden, per hectare: of wheat 2·37, of rye 2·64, of barley 3·11, and of oats 4·07 hl., given approximately.[3] In comparison with the average for Western Europe we sow, in Sweden, wheat 35 % more thickly, rye 28 %, barley 39 % and oats 37 %. The reason of these differences is really unknown. It has been ascribed to climatic causes, which should seem a good explanation, but the variations in different parts of Sweden scarcely point in that direction. — An account is given in a special section in the following pages of the extensive measures taken in our country for the *improvement* of seed.

TABLE 64. *Synopsis of the cultivation of grain in Sweden, 19th Century.*

Average for the years	Sown field. Hectares.	Crop etc. of all cereals. Quintals (à 1·97 cwts). Crop.	Need.	Surplus or deficit.[1]	Sowing.	Consumption.	Crop per hect. Quintals.[2]
1801/20	552,150	6,620,000	6,960,000	340,000	1,187,000	5,773,000	12·0
1821/40	724,300	9,025,000	9,040,000	15,000	1,560,000	7,480,000	12·5
1841/60	911,000	12,043,000	11,589,000	**454,000**	1,963,000	9,626,000	13·2
1861/80	1,289,926	17,225,000	16,207,000	**1,018,000**	2,770,000	13,437,000	13·4
1881/90	1,565,992	21,392,000	21,823,000	431,000	3,229,000	18,594,000	13·7
1891/00	1,687,765	23,429,000	25,399,000	1,970,000	3,416,000	21,983,000	13·9

[1] The heavy figures show the surplus (of export); the others, the deficit (i. e. the surplus of import). — [2] The figures for former years are extremely uncertain. The comparatively small increase is due to the extension of oat-cultivation, this grain yielding less per hectare than the others. A quintal per hectare = 0·8 cwt. per acre. — [3] An hectoliter per hectare = 1·11 bushel per acre (1·15 winch. bushel).

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Total cereal crops, yearly averages. By quintals. [1]

The only **autumn-seed** in Sweden are wheat and rye, lesser amounts of which are also cultivated as spring-seed (spring-wheat especially in the Läns of Halland, Elfsborg, and Östergötland; spring-rye especially in Kristianstad, Blekinge, and Halland). Of the total area of land devoted in 1900 to the cultivation of cereals, 474,970 hectares were taken up by autumn-seed and 1,232,343 hectares by spring-seed.

Amongst the **varieties** used in Sweden of late years may be mentioned Squarehead and Svalöfs English wheat, both of which, however, have shown that they can scarcely bear the long springs with cold nights and hot sunny days of Northern Sweden, and are therefore chiefly used only in Skåne. Several varieties of barley are sown, the six-rowed principally in Northern Sweden; of the two-rowed varieties, Chevalier, Plumage, Prentice (Princess) etc. Of varieties of oats, black-oats are most general in Central and Northern Sweden; in Southern Sweden, on the other hand, white-oats, of which the varieties Probstejer and Ligovo oats have been found particularly suitable, especially on the plains.

TABLE 65. *Production and consumption of cereals per inhabitant.* [2]

Average for the years	Total cereal crops. Kilog. per inhab.				Wheat and rye. Kilog. per inhab.				Other cereals. Kilog. per inhab.			
	Crop.	Need.	Seed.	Consump.	Crop.	Need.	Seed.	Consump.	Crop.	Need.	Seed.	Consump.
1801/20	**272**	286	49	237	**93**	104	16	88	**179**	182	33	149
1821/40	**313**	314	55	259	**114**	115	18	97	**199**	199	37	162
1841/60	**347**	334	57	277	**131**	130	19	111	**216**	204	38	166
1861/80	**407**	383	66	317	**131**	155	19	136	**276**	228	47	181
1881/90	**458**	468	69	399	**135**	186	19	167	**323**	282	50	232
1891/00	**475**	515	69	446	**143**	195	19	176	**332**	320	50	270

[1] A quintal = 100 kilograms = 1·97 cwts. — [2] The difference between »Crop» and »Need» consists in the surplus of import or export. A kilogram = 2·204 lbs.

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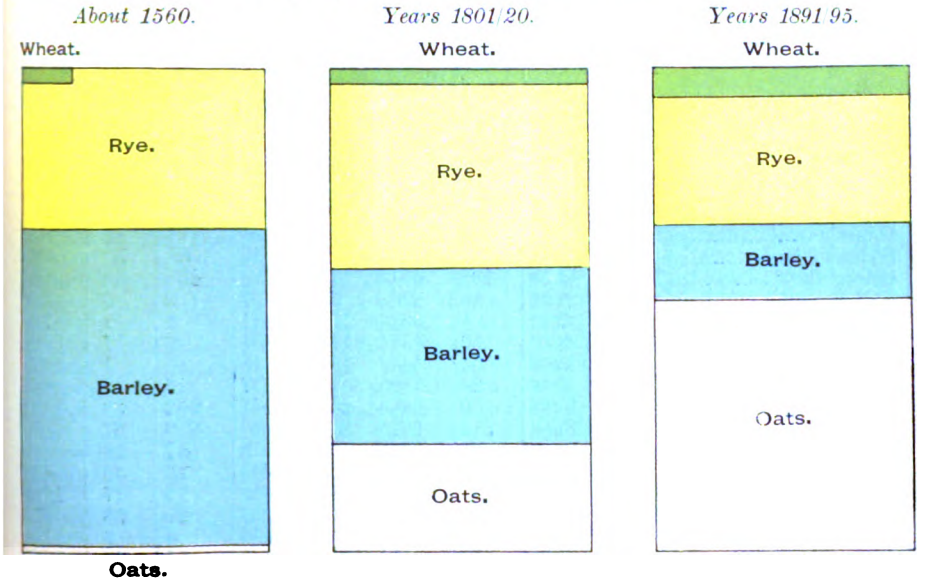
Proportional crops of the four principal cereals. (By weight).



The crop per hectare is, in general, very high in Sweden, when regard is paid to the northerly position of the country. Table 68 (p. 529) shows that amongst the sixteen countries there included, Sweden comes sixth in point of the relative crops of all chief kinds of seed together and stands pretty close to Germany. Compared with the average figure for Western Europe, there is reaped in Sweden per hectare 32 % more wheat, 21 % more rye, 13 % more barley, and 3 % more oats. The so much inferior position of oats when compared with that of the other kinds of corn can, possibly, be partly explained by the fact that in Sweden oats are sown to a great extent upon ground newly brought under cultivation. It is peculiar, however, that autumn-seed gives a decidedly better result than spring-seed. — It is a question, too, whether the figures for Sweden are not lower than they really ought to be to a still greater degree than is the case in most of the European countries.

TABLE 66. *Crops of the various cereals. By quintals (à 1·97 cwts).*

Average for the years	Wheat.	Rye.	Barley.	Oats.	Mixed Corn.	Leguminosæ.
1801/20	180,000	2,095,000	2,100,000	1,250,000	670,000	325,000
1821/40	325,000	2,975,000	2,450,000	1,700,000	975,000	600,000
1841/60	525,000	4,010,000	2,890,000	2,710,000	1,143,000	765,000
1861/80	807,000	4,751,000	3,209,000	6,668,000	1,075,000	715,000
1881/90	1,002,000	5,285,000	3,409,000	9,598,000	1,387,000	711,000
1891/00	1,233,000	5,806,000	3,145,000	10,748,000	1,843,000	654,000

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TABLE 67. *Average Crops. By Läns.*

Läns.	Total value. Million kronor.[1]		Average crop, in thousands of quintals.[3] In 1896/1900.						
	Grains.	Other plants.[2]	Wheat.	Rye.	Barley.	Oats.	Mixed Corn.	Leguminosæ.	Potatoes.
Stockholm	8·80	8·32	108	298	76	353	112	85	469
Uppsala	8·98	6·59	108	263	174	296	111	51	302
Södermanland	9·41	8·28	115	294	49	485	81	50	291
Östergötland	15·07	12·89	122	491	177	520	438	88	631
Jönköping	8·57	9·21	10	278	50	657	9	6	638
Kronoberg	6·89	7·37	1	204	114	441	2	1	715
Kalmar	9·64	8·83	50	434	147	434	9	17	626
Gotland	4·48	3·28	55	164	150	18	16	4	261
Blekinge	4·87	4·34	21	192	41	177	16	12	635
Kristianstad	14·48	10·83	80	504	229	541	262	30	1,399
Malmöhus	28·17	15·00	312	587	809	830	658	67	1,091
Halland	8·81	6·72	40	272	52	578	47	15	444
Göteborg och Bohus	7·99	6·18	12	138	57	442	13	49	473
Elfsborg	12·79	12·16	23	311	20	1,053	15	17	1,142
Skaraborg	16·09	12·70	84	556	46	1,237	22	53	957
Vermland	8·85	11·32	9	355	9	650	4	6	686
Örebro	7·58	8·20	54	215	28	545	14	20	467
Vestmanland	7·96	8·02	88	213	38	486	44	31	348
Kopparberg	5·97	7·92	7	155	39	373	50	6	353
Gefleborg	3·81	7·66	1	47	168	238	12	6	406
Vesternorrland	2·68	5·62	.	23	224	57	7	2	318
Jemtland	1·59	6·92	.	10	96	9	2	7	127
Vesterbotten	2·09	5·17	.	6	189	8	2	.	218
Norrbotten	2·86	5·53	.	7	159	6	.	.	93
Total	207·78	198·51	1,300	6,017	3,141	10,434	1,946	623	12,930

That the produce per hectare has increased in no unimportant degree in Sweden during the present century is beyond all doubt, and is confirmed by the following figures, which give the estimated crops per hectare, in quintals:[4]

Yearly.	Autumn-wheat.	Autumn-rye.	Barley.	Oats.	Mixed corn.	Pease.
1801/20	11·85	11·60	13·05	11·00	11·70	13·85
1871/80	13·95	13·72	14·70	13·06	14·29	14·95
1881/90	13·89	13·85	14·89	13·11	14·68	13·88
1891/00	15·73	14·64	14·36	13·18	15·05	14·27

These figures are, certainly, in themselves very unsafe, but it can scarcely be doubted that the direction they indicate is the right one. Some slight testimony to their probability is also found in the fact that less improvement is marked in barley than in the other chief kinds of cereals — a fact which usually happens when a rational system of farming is carried on.

[1] According to calculations by E. SIDENBLADH; the figures are averages for 1878 87. A krona = 1·10 shilling = 0·268 dollar. — [2] Roots, fodder-plants, straw, etc. — [3] A quintal = 1·97 cwts. — [4] A quintal per hectare = 0·8 cwt. per acre.

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TABLE 68. *Crops by hectare in different countries, in 1886/95.*[1]

Country.	Total cereal crops.[2]			Crops in quintals by hectare.[3]				Potatoes.
	Thousands of hectares.	Crops. Thousands of quintals.	Quintals per hect.	Wheat.	Rye.	Barley.	Oats.	Quintals per hectare.
Great Brit. and Irel.[3]	3,615	65,161	18·03	20·09	15·80	18·96	16·52	114·7
Belgium	817	14,682	17·97	18·46	16·80	21·03	18·31	152·5
Netherlands	445	7,705	17·31	18·67	14·33	23·88	18·88	110·7
Denmark	1,050	16,346	15·57	25·22	16·03	16·81	13·53	81·7
German Empire	13,751	193,361	14·06	15·63	12·61	15·95	14·48	104·7
Sweden	1,481	20,424	13·79	14·82	14·36	14·71	13·20	85·7
United States[6]	58,175	696,189	11·97	8·58	7·95	12·66	9·36	44·7
Hungary	8,921	104,618	11·73	12·42	10·17	10·77	8·99	58·3
West Austria	4,085	46,714	11·44	12·18	11·26	12·52	10·17	74·4
France	13,798	157,590	11·42	11·92	10·65	11·67	10·58	78·6
Finland[4]	642	6,691	10·42	11·83	10·65	9·66	10·50	92·5
Roumania[5]	4,129	40,062	9·70	10·65	9·65	9·51	7·58	50·0
Italy	7,346	58,704	7·99	7·40	7·51	6·03	6·47	39·2
Spain[7]	5,800	46,348	7·99	7·70	7·00	8·00	7·00	75·0
Galicia-Bukowina	2,388	18,694	7·83	8·54	7·14	8·51	6·81	86·8
Russia[5]	63,184	394,436	6·24	5·57	6·41	6·79	6·22	52·0
Western Europe	54,400	649,991	11·95	11·20	11·89	13·05	12·77	95·8
Eastern Europe	84,745	610,515	7·20	7·36	6·64	7·78	6·45	55·6
Europe	139,145	1,260,506	9·06	9·19	8·06	10·09	9·19	80·7

If, possibly, the progress marked above seems to be a less important one as the result of almost a century's work, it must be remembered that the area of arable land has been trebled during that time, and that thus large tracts have been brought under the plough, which, in point of original quality, could not compare with the land having been long under cultivation.

The crops vary very much per hectare in the *different parts* of Sweden. As regards barley, this is shown by the map on page 536, and for all the principal kinds of cereal, by Table 69. Striking about this is the extraordinarily favourable position presented by the Läns of Kopparberg and Gefleborg, in spite of their somewhat northerly position. The explanation of this, at least for the Län first named, lies in the fact that there the ground is parceled out into smaller lots than anywhere else in the kingdom, and that the small farms, in consequence, amongst other things, of a rich supply of manure, are cultivated with a care which can scarcely be matched anywhere in Sweden but in Skåne.

On the whole, however, it is the *Län of Malmöhus* which gives the richest harvests, as is quite natural, too. If the figures for this Län be compared with the average figures for some Western European lands,

[1] The figures for the different cereals are usually arithmetical media of the relative figures for the ten years. — [2] Wheat, spelt, rye, barley, oats, Indian corn. — [3] Crop of rye per hectare only evaluated. — [4] Area only calculated. — [5] Approximate figures. — [6] The comparative high figure as regards the yield per hectare of the total cereal crop (11·97 quintals) is due to the Indian corn, which yields 14·79 quintals per hectare. — [7] Quite uncertain figures. — [8] A quintal per hectare = 0·8 cwts. per acre.

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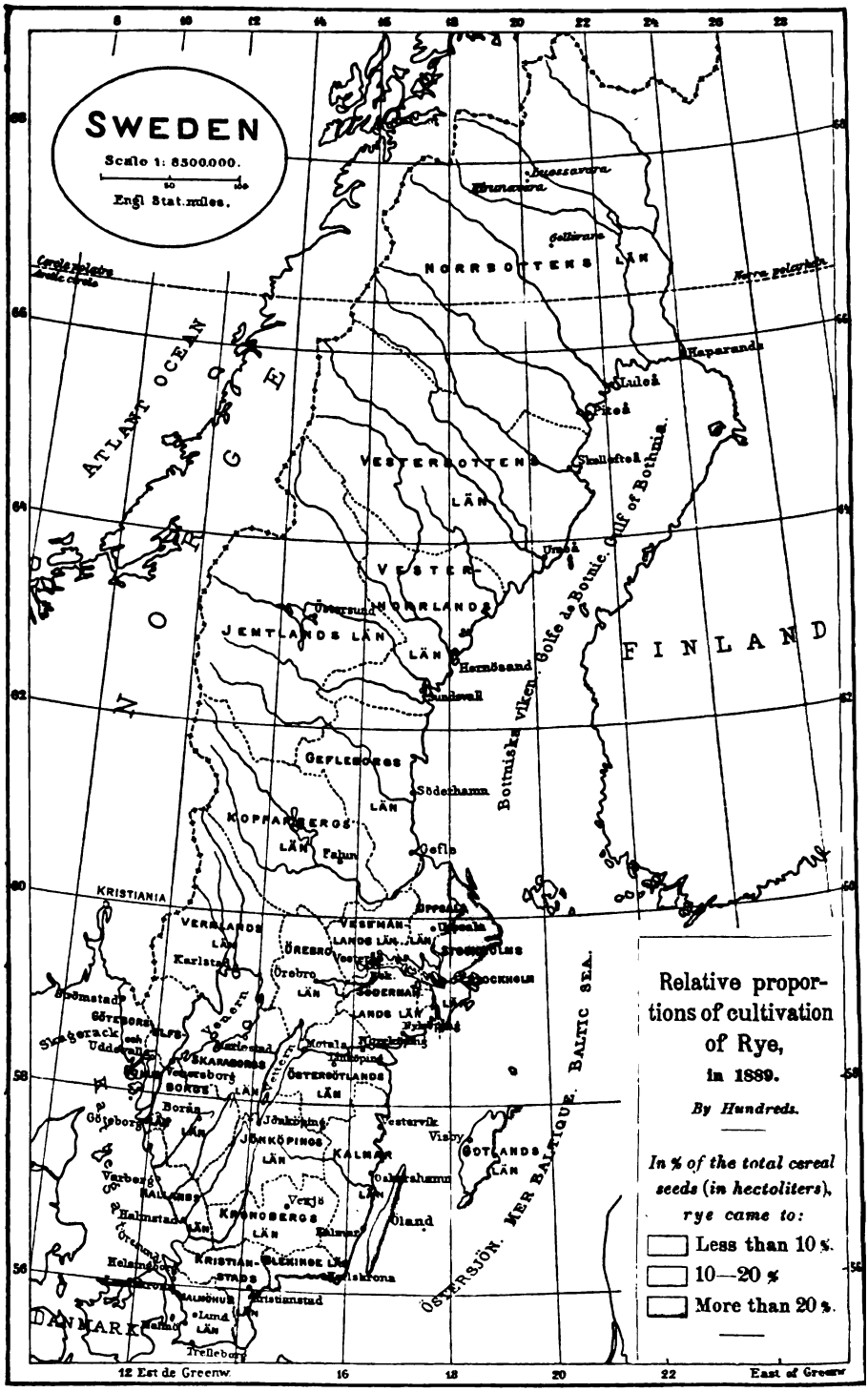

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TABLE 69. *Fall and Spring crops. Yield per hectare.*[3]

Läns.	Acreage, 1900. Hectare.		Value of Fall-crop, %.[1]	Average crop per hectare, 1886/95. Quintals.				
	Fall-crop.	Spring-crop.		Wheat.	Rye.	Barley.	Oats.	Potatoes.
Stockholm	25,604	49,695	38	14·28	15·44	14·26	12·86	101·8
Uppsala	20,606	46,594	42	14·41	15·44	15·70	12·71	86·5
Södermanland	24,819	52,503	42	15·54	15·76	14·01	12·68	92·8
Östergötland	38,509	89,349	32	14·51	15·24	15·85	13·33	82·9
Jönköping	18,927	50,542	27	11·05	13·37	12·21	14·28	75·5
Kronoberg	13,539	43,326	27	.	13·01	14·14	14·27	97·7
Kalmar[2]	35,637	54,447	45	11·52	11·05	12·92	12·69	82·7
Gotland	15,245	20,275	56	11·45	14·80	13·19	10·07	72·2
Blekinge	16,269	23,316	45	11·87	10·93	14·62	13·99	90·9
Kristianstad	37,931	80,225	37	15·64	13·52	13·86	12·31	71·4
Malmöhus	48,100	129,754	28	17·78	17·80	18·16	16·25	89·1
Halland	20,283	51,500	28	16·28	15·71	13·19	13·18	72·2
Göteborg och Bohus	10,127	46,948	22	13·75	15·25	12·28	12·35	103·8
Elfsborg	23,895	85,955	21	14·76	13·99	11·96	12·58	107·0
Skaraborg	43,491	116,889	31	13·78	14·45	13·06	12·35	75·0
Vermland	25,454	73,824	28	11·68	12·00	9·40	10·18	86·7
Örebro	19,648	47,997	33	14·29	13·98	12·78	13·17	90·0
Vestmanland	19,603	46,962	36	14·49	14·91	13·27	12·45	102·1
Kopparberg	10,739	30,189	25	12·56	17·01	16·80	13·58	122·4
Gefleborg	2,915	27,592	16	.	16·79	16·05	16·78	127·0
Vesternorrland	1,827	21,629	8	.	11·64	13·42	.	89·3
Jemtland	863	10,799	6	.	11·18	12·58	.	144·7
Vesterbotten	483	18,230	2	.	8·58	11·41	.	91·4
Norrbotten	456	13,803	4	.	12·68	13·90	.	92·8
Entire kingdom	474,070	1,232,343	31	14·82	14·86	14·71	13·20	85·7

the agriculture of which is usually considered as being in a high state of perfection, the result will be the following, on an average for the years 1886/95, and in quintals per hectare[3]:

	Wheat.	Rye.	Barley.	Oats.
Län of Malmöhus	17·78	17·80	18·16	16·25
Denmark	25·22	16·03	16·81	13·53
Great Britain and Ireland	20·09	15·80	18·96	16·52
Belgium	18·51	16·86	21·60	18·60
German Empire	15·63	12·61	15·95	14·48
France	11·92	10·65	11·67	10·58

The result cannot but be considered as very flattering for the Swedish province, situated between 55 and 56 degrees N. lat.

Next to the Läns of Malmöhus, Kopparberg, and Gefleborg (see above) those of Kristianstad, Halland, Göteborg och Bohus, together with Östergötland and the district round Lake Mälaren, are the tracts of our country which give the richest crops per hectare. The harvest is less good, on the other hand, in several of the districts where the cultivation of oats is greatly in the preponderance. This circum-

[1] Percentage value of the Fall-crop as compared with the value of the total cereal-crop, according to calculations by E. Sidenbladh for the years 1878-87. — [2] On the island of Öland the crop is by hectare: wheat 10·8, rye 10·3, barley 12·6, oats 10·0 quintals. — [3] An hectare = 2·47 acres. A quintal per hectare = 0·8 cwts. pr acre.

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TABLE 70. *Imports and exports of Wheat. By quintals à 1·97 cwts.*

Average for the years	Imports.			Exports.			Excess of imp. (—), » exp. (+).
	Not ground.	Flour.	Total.[1]	Not ground.	Flour.	Total.[1]	
1816/20	14,989	51	15,057	537	570	1,297	— 13,760
1821/40	1,456	104	1,595	5,423	1,889	7,942	+ 6,347
1841/60	17,370	5,384	24,549	35,558	817	36,647	+ 12,098
1861/70	27,296	85,351	141,097	58,061	3,043	62,118	— 78,979
1871/75	11,929	157,313	221,680	90,478	24,193	122,735	— 98,945
1876/80	59,731	292,585	449,844	87,512	23,821	119,273	— 330,571
1881/85	458,111	307,387	867,960	8,480	52,123	77,977	— 789,983
1886/90	460,743	260,421	807,971	10,706	36,265	59,059	— 748,912
1891/95	1,151,039	231,071	1,459,134	244	6,756	9,252	— 1,449,882
1896/00	1,355,673	87,264	1,472,025	297	10,113	13,781	— 1,458,244
In 1900	1,579,075	86,684	1,694,654	372	2,403	3,576	— 1,691,078

stance probably points out that the cultivation of oats has been carried to an excess and has consequently exhausted the land. An analogous circumstance is that rye in many places gives a poor crop in those provinces where the cultivation of rye is most generally carried on.

The weight per hectoliter of Swedish cereals seems, in general, to be pretty high. The official statistics of the crops give the following results for late years, in kilograms[2]:

Average.	Autumn-wheat.	Autumn-rye.	Barley.	Oats.	Mixed corn.	Pease.
1871/80 (approx.)	78·1	71·8	63·5	46·9	55·0	79·2
1881/90	78·1	72·4	63·8	47·4	54·6	78·8
1891/00	78·1	72·7	63·5	48·1	56·1	79·3

These figures are higher, in the case of oats especially, than those usually given for most other countries. The same remark holds good, in a certain degree, for barley, if we disregard Northern Sweden, the average weight of barley per hectoliter in the seven most northern Läns of Sweden, in the years 1874/93, being but 57·1 kilograms, while in

TABLE 71. *Imports and exports of Rye. By quintals à 1·97 cwts.*

Average for the years	Imports.			Exports.			Excess of imp. (—), » exp. (+).
	Not ground.	Flour.	Total.[1]	Not ground.	Flour.	Total.[1]	
1816/20	160,131	642	160,987	1,113	24	1,145	— 159,842
1821/40	40,210	2,323	43,307	11,134	999	12,466	— 30,841
1841/60	84,335	36,827	133,438	130,571	390	131,091	— 2,347
1861/70	467,085	154,106	672,560	33,263	2,125	36,096	— 636,464
1871/75	582,270	279,142	954,459	36,334	6,419	44,893	— 909,566
1876/80	1,083,792	358,058	1,561,203	27,636	8,439	38,888	— 1,522,315
1881/85	1,549,729	205,078	1,823,166	11,208	24,618	44,032	— 1,779,134
1886/90	1,330,249	237,479	1,646,888	6,080	8,858	17,891	— 1,628,997
1891/95	1,001,796	141,822	1,190,892	1,408	2,218	4,365	— 1,186,527
1896/00	1,010,152	62,397	1,093,348	438	31,264	42,123	— 1,051,225
In 1900	1,322,494	61,816	1,404,915	272	56,149	75,137	— 1,329,778

[1] The flour increased in weight by 1/3, to compensate for grinding. — [2] A kilog. per hectoliter = 0·8 lbs per imp. bushel = 0·777 lbs per winch. bushel.

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TABLE 72. *Imports and exports of Barley. By quintals à 1·97 cwts.*

Average for the years	Imports.	Exports.	Excess of exports.	Average for the years	Imports.	Exports.	Excess of exports.
1816/20.....	60,826	2,079	— 58,747	1871/80.....	77,372	349,560	+ 272,188
1821/30.....	19,085	14,730	— 4,355	1881/90.....	80,330	235,467	+ 155,137
1831/40.....	39,304	18,212	— 21,092	1891/95.....	72,106	39,625	— 32,481
1841/50.....	8,618	67,121	+ 58,503	1896/00.....	52,612	846	— 51,766
1851/60.....	33,968	191,025	+ 157,057	In 1900....	103,702	1,457	— 102,245
1861/70	50,048	243,702	+ 193,654				

the seventeen other Läns it was no less than 65·6 kg., which last-named figure is, undeniably, uncommonly high. — In the *Län of Malmöhus*, on an average for the years 1886/95, wheat is stated to have weighed 78·8 kg. per hl., rye 74·1 kg., barley 66·7 kg., and oats 50·7 kg. Still higher figures for barley are shown by the Län of Kalmar, with 68·7 kg., and Gotland with 69·0 kg. Barley from the islands of Gotland and Öland is, too, very much in demand at the breweries. — The above-mentioned circumstance, that the weight of barley is less in Northern Sweden than elsewhere in the kingdom, holds good, too, for other crops even if not in so great a degree as for barley. Oats are harvested in the four northernmost Läns, to a great extent, only as green crops, and the more so the farther one comes to the north.

The Import and Export of cereals are illustrated in their entirety by Table 64. Data for the four chief kinds of cereals are given in Table 70—73. First, as concerns *wheat*, Table 70 shows that the import of that cereal upon a large scale commenced in the sixties. Since a duty was placed upon that import in 1888, the import of flour has decreased. At present the duty amounts to 3·70 kronor per quintal (2 shillings per cwt) for unground wheat, and 6·50 kronor per quintal flour (3 shillings 8 d. per cwt). — The import of *rye*, which also greatly increased after 1860, has diminished of late years, probably on account of the duty being the same for rye as for wheat. In this case, too, it is the import of flour which has most decreased. — A certain export of *barley* has long taken place; if not a very important one, still it has been pretty constant, but of late years this export, too, has almost ceased.

TABLE 73. *Imports and exports of Oats. By quintals à 1·97 cwts.*

Average for the years	Imports.	Exports.	Excess of exports.	Average for the years	Imports.	Exports.	Excess of exports.
1816/20.....	5,214	4,308	— 906	1871/80.....	7,970	2,405,272	+ 2,397,302
1821/30.....	3,954	15,806	+ 11,852	1881/90.....	29,307	1,977,100	+ 1,947,793
1831/40.....	7,992	39,994	+ 32,002	1891/95.....	21,730	1,410,318	+ 1,388,588
1841/50.....	109	146,697	+ 146,588	1896/00.....	213,740	347,664	+ 133,924
1851/60.....	2,099	426,261	+ 424,162	In 1900.....	587,888	125,969	— 461,919
1861/70.....	2,851	1,381,059	+ 1,378,208				

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As concerns *oats*, this cereal was, for two or three decades, one of the principal exports of the country — chiefly to England and France. The consumption within Sweden itself has, however, so greatly increased in connection with the great development of dairy-farming, that there is less and less of this cereal left for export. The failure of the oat crop on one or two occasions has also contributed to the very poor results of the last few years. Swedish oats continue, however, to enjoy a good reputation in the markets of the world on account of its quality, of which the figures given above regarding its weight also bear witness. — Both the imports and exports of *other Swedish cereals* than those we have named are inconsiderable.

Indian corn occupies a distinct position within corn-imports. Of this cheap and excellent cereal, in our time so commonly used, the imports to Sweden during the decades 1861/1900 have amounted to an average per year of, respectively, 725, 64,368, 90,403, and 146,441 quintals. During 1896/1900 the yearly imports amounted to 189,757 quintals, and in 1899, which reached the maximum, to 386,015. The cause of the Indian corn imports still keeping within these comparatively narrow limits is to be found in the entrance duty, which at present is 3·70 kronor per quintal (i. e. 50 cents per cwt). Endeavours made to get this customs duty abolished have as yet not been successful.

The consumption of cereals in our country is given in its entirety in Tables 64 and 65, and, as far as wheat and rye are concerned, in the first part of this work, in the chapter on the consumption of necessaries of life some data are given for each cereal separately (Table 30, p. 156). Of the other kinds of cereal than wheat and rye there were consumed annually in 1801/20 about 149 kilog. per head of the population (cf. Table 65); in 1891/00, on the other hand, 270 kilog. — seed-corn not included in either case. The increase is exclusively in the oats, of which corn Sweden nowadays uses more, relatively, than does any other country with the exception of Denmark and the United States. In 1881/90, there were consumed annually per head of the population, 26 kilog. of mixed corn, and 7·7 kilog. of pease.

TABLE 74. *Cereal prices in Sweden, 1836/1900.*[1] *Kronor per quintal.*[2]

Average for the years	Wheat.	Rye.	Barley.	Oats.	Average for the years	Wheat.	Rye.	Barley.	Oats.
1836/40	13·71	11·07	9·86	7·64	1871/75	18·78	14·29	13·77	11·54
1841/45	14·27	12·00	8·99	6·86	1876/80	17·11	13·43	13·12	10·99
1846/50	13·92	11·25	10·04	7·89	1881/85	15·88	12·87	11·60	9·76
1851/55	17·75	14·10	12·25	9·55	1886/90	12·82	10·05	10·06	8·15
1856/60	18·26	13·01	12·90	10·42	1891/95	12·86	11·22	10·71	8·98
1861/65	15·76	12·80	11·29	8·95	1896/00	13·94	11·78	11·66	9·32
1866/70	18·09	14·65	13·24	10·59					

[1] These figures, which are official, and are fixed as cash payment for certain products originally presented as fees *in natura*, appear generally to be too low, but they indicate, at least approximately, the course of the fluctuation. — [2] A krona per quintal = 6·7 d. or 13·6 cents per cwt.

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The prices of cereals in Sweden during the last few decades are shown by Table 74. The figures are probably somewhat too low in general, but show, pretty nearly in any case, the tendency of the changes in price. Since 1888, these prices have been dependent, in a certain degree, upon the duty — as they were during the period *before* 1858. During the years 1858/87 cereals were, on the contrary, admitted duty-free to the country.

The Straw-crop, finally, in a way also belongs to the corn-cultivation. On an average, the straw-crop is calculated upon the autumn-seed (wheat and rye) at about 30, and upon the spring-seed, at about 20 quintals or a little more, per hectare. The total amount will, then, be at present about 14 million quintals autumn-seed straw, and about 24 million quintals spring-seed straw, or altogether, 38 million quintals. Other calculations give a somewhat higher result.

Root-crops.

The root-crops cultivated to any greater extent in Sweden are, apart from those of market-gardens: potatoes, sugar-beet, turnips, swedes, and carrots. The area of land used for the purpose amounted in 1900 to 203,575 hectares, or 5·78 % of the whole extent of arable ground.

A) **Potatoes** were brought to Sweden as early as 1723, by *Jonas Alströmer*. At the beginning of the 19th century, however, potato-cultivation had gained but little ground; the area devoted to the purpose probably did not exceed 5,000 hectares. By the middle of the century this area had increased to more than 80,000 hectares, and amounted in 1900 to 154,645. How the crop has increased is shown by the diagram on page 538.

During the period 1891/1900 there were gathered annually in Sweden 13,286,000 quintals of potatoes (if a hectoliter is taken as weighing 70 kg.). Per inhabitant, this corresponds to 269 kg., which is but little inferior to the average figure for Western Europe, which was 304 kg. If we take away the seed-potatoes, which are given as amounting to about 18·2 hectol. or 1,270 kilog. per hectare, the annual consumption in Sweden during the period named, amounted to about 228 kg. per head. The import of potatoes is, on the whole, inconsiderable; it has, however, increased of late years. About 1 million quintals are used annually in the manufacture of spirits.

The crop per hectare amounted in the years 1891/1900 to 84·3 quintals on an average, against 101·1 quintals for the whole of Western Europe. Curiously enough, this relative production seems to have been greater in our country in the first part of the century than it is at present, a fact which may probably be attributed to a more careful cultivation, at a time when potato-growing was comparatively new.

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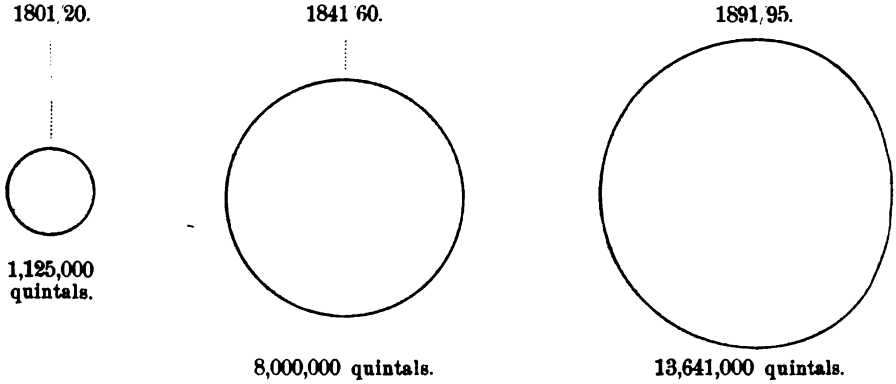
Potato-crop, yearly averages.[1]



On the whole, the cultivation of potatoes in Sweden has not especially increased during the last few decades, which doubtlessly stands partly in connection with the decrease in the manufacture of spirits. At the present day, the cultivation of potatoes is relatively greatest in the Län of Kristianstad, which also produces most spirits.

Of late years, several new varieties of potatoes have been introduced into Sweden, of which the Magnum bonum has won most favour, in consequence of its unusually great power of resistance to the diseases which affect potatoes.

B) **The cultivation of the Sugar-beet** has made immense progress in Sweden during late years, of which a more detailed account is presented in the following pages, in the section on the Sugar-industry. Beet-growing is, as well known, of great importance on the whole for the improvement of agriculture. The careful working and great artificial manuring of the ground which is necessary if beet-cultivation is to be remunerative, has increased the productive qualities of the soil, even in regard to other crops, and the cereal-harvest in beet-growing districts has, therefore, not at all diminished in the same proportion as the cereal-bearing area.

The sugar-beet can be profitably cultivated in Sweden only in the most southern parts of the country: Skåne, Halland, and Blekinge, in the southern part of the Län of Kalmar, and in the islands of Gotland and Öland. The total area employed amounts to about 30,000 hectares, and the crop to about 9 million quintals. On an average, the crop usually amounts to about 300 quintals per hectare.

C) **Other root-crops,** turnips, swedes, and carrots, are cultivated over an area of about 18,000 hectares. At the rate of 400 quintals per hectare, the crop would amount to about 7 million quintals annually, but precise figures are not to be had. Only in certain parts

[1] A quintal = 1·97 cwts.

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of the country has the cultivation of root-crops reached a satisfactory extent. With the development of dairy-farming, these corps have come more and more into use as cattle-fodder, but farmers have not as yet fully learned to appreciate the value of root-crops in cattle-breeding, and their importance in an ordered rotation of crops.

Green-crops.

Of the total area of **arable land** in 1900 — 3,519,881 hectares — 1,190,226 hectares, or 33·8 %, were used for green-crops. We have already shown (page 521) how this relative proportion has increased of late years. Of the area just named, 160,791 hectares are used as grazing land, or for greenfodder-crops, and 1,029,435 hectares for haymaking.

The fodder-crops generally cultivated in Sweden are timothy, and red- and Alsike clover. Timothy was cultivated in Dalarne as early as during the 18th century. Alsike clover was observed by Linné about 1750, growing wild on the border of ditches in Alsike parish in Uppland. He attracted the attention of agriculturists to this plant as being hardy and little dependent upon climate: it is now cultivated in most countries.

It was only with the introduction of the custom of rotation of crops, that fodder-plants have found a place to any greater degree upon cultivated fields. Of late years, it has been found advantageous to mix several other kinds of grass-seed in sowing pasture-lands, in order to make these serviceable for a greater number of years, and more reproductive.

The crop from artificial meadows is officially estimated in our country at 28 quintals per hectare (22 cwts. per acre), thus, at present in ordinary cases, at something over 28 million quintals. Some estimates place the crop per hectare a little higher. In addition we have the hay-crop from **natural meadows,** which is calculated at 10 à 11 quintals per hectare (8 à 9 cwts. per acre), or, altogether, about 16 million quintals.

The crop of *seed* (clover, timothy etc.) was given in 1900 as 60,499 quintals, but reports are incomplete. The *imports* of grass-seed amounted in 1900 to 24,877 quintals (after subtracting the export), from which it appears that the home production is insufficient.

Sweden possesses a very important extent of **pastures,** but nearer details respecting extent and yield are wanting.

Formerly, as long as biennial and triennial rotation of crops were in use, the larger domestic animals had to support themselves by grazing in the cattle-enclosures and forest-pastures, and, when the natural meadows had been mowed, there also. Pastures are still of great importance in many parts of the country. In Norrland and Dalarne there are juicy, aromatic mountain pastures, whither the cattle are led from the farms in early summer, and where casual shealing called »*fäbodar*», are erected, in which the caretaker and the cow-herd live, and where butter and cheese are made. Not till the autumn sets in, are the cattle re-conducted to the farms. In Central and Southern Sweden the milk-cows are seldom taken out to graze; in farms carrying on a rational system of agriculture,

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only upon artificial swards, grazing within cattle-enclosures being used chiefly for young horses and cattle. Smaller farmers, crofters, and labourers in many places let their cattle go grazing on forest-pastures, but the right to the use of these has begun to be restricted, since the introduction of more modern forestry. In many Läns it is forbidden to let goats graze in the woods, a fact which has contributed to the diminution of these animals. Where care is taken of the woods, sheep are not willingly allowed to graze in these. The best pastures in Southern Sweden are in Småland and Gotland, where the ground is covered with different grasses and a number of herbs, amongst which many are leguminous. Leaf-trees of many kinds, mostly oak and birch, stand more or less closely together upon the pasture-grounds. Of late years, permanent pastures have been laid out, which are used, partly for hay-harvest and partly for grazing.

Other cultivated plants

are of little importance in Swedish agriculture. Some data respecting the cultivation of *flax* and *tobacco* are given in the corresponding sections of the chapter on industries. Besides these, there is scarcely anything else to be mentioned than that *rape-seed* is cultivated in some parts of Skåne — with very variable results from one year to the other.

The total acreage devoted to the growing of other crops than cereals, root-, or fodder-crops amounted in 1900 to but 4,861 hectares, of which 3,926 hectares gave crops of textile plants.

Agricultural Machinery and Implements.

The more general use of agricultural machinery can be dated from the decade 1871/80; thrashing-machines were in general use, however, also during the sixties. As is well known, machinery plays a very important part in modern agriculture, and this is more and more becoming the case in Sweden, too. At first the more complicated machines were imported from abroad, especially from America, but of late years the Swedish manufacture has attained considerable dimensions and perfection. In 1900, Sweden imported agricultural machinery and tools to the value of 1,552,992 kronor, but exported such goods — mostly embracing dairy machinery — to a value of 6,326,190 kronor.

A short notice is here given of newly invented machinery, or of such as has been much changed in form, employed in agriculture proper.

Ploughs. The old-fashioned ploughs, which consisted of iron-shod wooden beams, were generally changed, during the forties, for English ploughs which had rarely been in use ever since the beginning of the century and which had chiefly the same shape as the modern swing-plough. The Vermland plough, which was in use as early as the 18th century, is still common and has served as a model in the construction of several new forms of ploughs, even in foreign countries.

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The introduction of the iron plough has been of the greatest importance for agriculture. At first, wood was used for the frame, and cast and wrought iron for the other parts. Nowadays, steel is used for the bills and knives, and iron for the other parts. The home manufacture of ploughs began in the forties at several iron-works, such as Svanå in Vestmanland, and Näfveqvarn and Åker in Södermanland: many thousands of the strong Åker ploughs are exported, especially to the Cape and North America, where they are used in the first ploughing of wood-clearings. In the fifties, Öfverum Works in the Län of Kalmar, made a specialty of the construction and manufacture of ploughs and of other agricultural implements, and soon brought its figures to 3,000 ploughs and nearly 1,000 other agricultural implements yearly. In 1860, Öfverum exhibited 14 different numbers of swing-ploughs. In addition to these, skim-ploughs, drill-ploughs etc., came into use, and were continually improved both in point of construction and of material. The latest types, constructed almost exclusively of steel, are now greatly used. Even steam ploughs are found on some few large farms; these are, however, not suitable except on the most level of our plains.

The double mould-board plough, which is certainly the oldest implement for labouring the ground with the help of animals, and which originally consisted of a tree-trunk with two branches or roots left, has been developed and improved of late and is now mostly manufactured of iron, and is still in general use.

Harrows and rollers. Before 1840, *harrows* with straight teeth were used for smoothing the ploughed-up soil, the teeth being made partly of wood, partly of iron; drags (»the Swedish harrow») were also used, with their crooked or goose-feet-shaped teeth. The construction of the harrow has continually improved, but it is only during the last decade that an essentially new form has come into use, in the shape of the American spring-harrow. The old Swedish rolling-harrow, which was formerly built with the frame and rollers of wood, is now mostly also made entirely of iron. The old-fashioned Småland link-harrow is still in use for hilly and stony ground. The chain and link-harrows are used for clearing the ground from weed-roots (especially crouch-grass), and for harrowing in grass-seed; both home and foreign constructions are used. Plate-harrows were introduced about 1880, and have come into use on fen-lands.

From olden times, flat *rollers* of heavy wood (and sometimes of iron), and grooved rollers of wood, shod with iron upon the grooves, and drags (tooth-drags in Uppland) have been used for breaking up the clods, and smoothing and leveling the surface of the fields. Amongst iron-rollers, the Cambridge one is that which is most used at present: the very similar Crosskill-roller was used as early as the fifties, here and there. The double ring-roller from France has come greatly into use since 1870.

Sowing-Machines. Polhem, Sweden's earliest great mechanical inventor, constructed, as early as in the 17th century, a corn-drill, which, however, was considered as somewhat complicated, and presupposed level ground; in 1749, Thunberg constructed a broad-sowing machine with light harrow, which was successfully tried: models of both of these are to be found in the Museum of the Academy of Agriculture. In more general use, and much in demand was the corn-drill invented by Count Cronstedt (1765). Most probably, the use of the corn-drill has not played any great rôle before the seventies, when not only foreign machines were imported, but a home manufacture commenced also. Nowadays, such machines are used upon almost all large farms, and, in many districts, also by small farmers.

Reaping and Harvesting Machinery. The form of the *scythe* has not changed much since times immemorial. Linné, in 1749, mentions the Skåne scythe as peculiar on account of the length of the handle, which permitted the mower to go almost erect. This is still very common. Scythes are always

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made of hard steel, which is to be sharpened; never of steel so little hardened that an edge can be hammered out instead of its being sharpened, as is the case in many countries. — Risingh, as early as 1670, speculated upon harvesting-machines in the form of waggons with many scythes. Satisfactory constructions both of mowing and of harvesting-machines were developed in America before 1850, and reached Sweden towards the end of the decade then beginning, but it was not till in the seventies that they came into more general use. Nowadays *mowing-machines* are found, not only on all the great farms but also upon a great number of the smaller ones; it is only in stony wood-districts they are not used. In Norrland they are very general. Amongst the *harvesting-machines* those first introduced, with the sheaves to be removed by hand, have kept their place, side by side with the somewhat later introduced self-deliverer, where a rake, with a circular motion, is affixed, which sweeps off the sheaves gathered upon the board of the machine. A Swedish modification of the American types is the Palmcrantz one, which, however, is not generally used. Self-binders have, of late years, come more and more into use.

Horse-rakes of wood, or of wood with iron pins, have been used in level districts for a long period. The English horse-rake, on wheels, and of iron, began to be introduced and manufactured in Sweden about 1850, but never came into any very general use before the improved American model commenced to be imported about 1870. This horse-rake is, perhaps, the implement which, in consequence of its light make and the excellence of the slender material, has most quickly gained recognition, both as regards durability and saving of labour; it is now found everywhere in Sweden.

Threshing-machines. During the first half of the 18th century many speculations were indulged in respecting the construction of a machine suitable for threshing, and such machines of different forms, some with flails, some with stampers or rollers, and driven by horse or water-power, were constructed in Sweden. These machines did not come into any very general use, however. It was only since the so-called threshing-mills, invented in Scotland about 1790, commenced to be imported and used here, that threshing-machines began to spread about the country; few were built before 1800, but about 1820 they were in pretty general use on large estates, and, in Gotland, on smaller farms, too.

These threshing-machines were stationary, with great, heavy wheels of wood, and but little iron was used in their construction. It was not till they were made smaller, with iron wheels and moveable, that they came into more general use. During the seventies and eighties, the threshing-machine may be said to have found its way to every farm in Sweden. Steam threshing-machines came into the country at the end of the fifties, increased greatly in use during the seventies, and during the last decade have begun to be generally purchased, even by small farmers, who form companies for this purpose, with sometimes as many as 20 share-holders. The Swedish manufacture of steam threshing-machines was commenced as early as in the sixties by Munktell in Eskilstuna and many others, and is now pretty extensive. The principle of all the newer kinds of threshing-machines is, however, always the same as that of the original Scotch machine, although the pegdrum threshing-machine presents several differences.

Winnowing-machines. As early as the middle of the 18th century, winnowing-machines are described by Brauner, and he mentions one, constructed by Sven Ljungquist, as being the best. In the proceedings of the Royal Academy of Sciences for 1763, a winnowing-machine, invented by Count Cronstedt, is described and illustrated. Winnowing-machines with both riddle and fan came into use about the decade 1861/70, and are now in general use. It is now only exceptionally that they are put in connection with horse-gear threshing-machines, but are considered as natural appendages to steam threshing-machines.

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Sorters. Seed-sorters have, it is highly probable, been used as early as in the 18th century; the riddle, with holes of different sizes, is, of course, such a »sorter» in comparison with the hand-sieve. The sorters introduced in the seventies displayed a great likeness to the Brauner-sorter of 1752. As sorters are pretty dear, but still can be moved by means of ordinary waggons, and are not specially delicate machines, they are often purchased by agricultural societies, or their divisions, to be lent for use; it is by this means easier, too, to obtain the newest and the best constructions.

Two new seed-sorters have come much into use, and have proved to be very practical for lesser work: the Tidaholm Works' grain-sorter, and Tisell's seed-grain riddle.

Hand-implements were mostly made of wood until the sixties, but English implements of iron were found, however, during the forties and fifties. But the later imported American steel implements presented such great advantages both in point of lightness and construction, that their use spread rapidly, and they are now general throughout the country. Since 1880, those used are mostly of Swedish make, which does not differ in construction from the American. Pitch-forks, which were formerly not used, now partly replace spades, especially for garden-soil. Dung-forks, which even in the middle of the seventies were generally made of wood with iron fittings, and which became much heavier on account of the moisture they imbibed, are now replaced by slender 4- or 5- pronged forks. The old-fashioned wooden shovels have been generally exchanged for shovels of steel-plate. The outer forms, too, have been improved, made slenderer and more effective, in accordance with American models. Hand-rakes with wooden teeth are still commonly used, but besides these there are also found rakes of steel-plate, pressed in one piece, with concave teeth, and with wooden handles.

The reader is referred to the articles in the following pages on Dairies and on the manufacture of Machinery, for information respecting the **manufacture** of agricultural machinery and implements, which is now extensively and successfully carried on at a number of works, factories, and mechanical work-shops in the country.

Horticulture and Floriculture.

Much labour has been successfully expended on Swedish soil in general, from which fact gardening has derived great benefit, although, as a source of industry, it occupies as yet a subordinate position. During the last few decades, the cultivation of garden products for market purposes has considerably advanced.

The area of gardens, orchards, hop-yards, and cabbage-yards in Sweden, for 1900, is given as 37,661 hectares, corresponding to about one per cent of the extent of cultivated land, a proportion which is also to be met with in many other countries. These figures do not include the area of *parks*, which, in many parts of our country, is quite considerable.

Swedish horticulture dates from a very early period. As early as the 12th century fruit-trees were grown; and so-called »spice-gardens», as well as flower-gardens have existed in the country for many centuries.

Until the close of the 17th century, however, horticulture does not seem to have been carried on to any great extent. During the 16th and 17th centuries horticultural literature was astonishingly rich in Sweden. At the close of the 17th century there were quite extensive garden-grounds on the larger estates, laid out according to the French style, and characterized by dressed trees and hedges, geometrically formed flower-beds, alleys, magnificent fountains, etc. At this period Swedish horticulture had undoubtedly reached a high point of perfection, from

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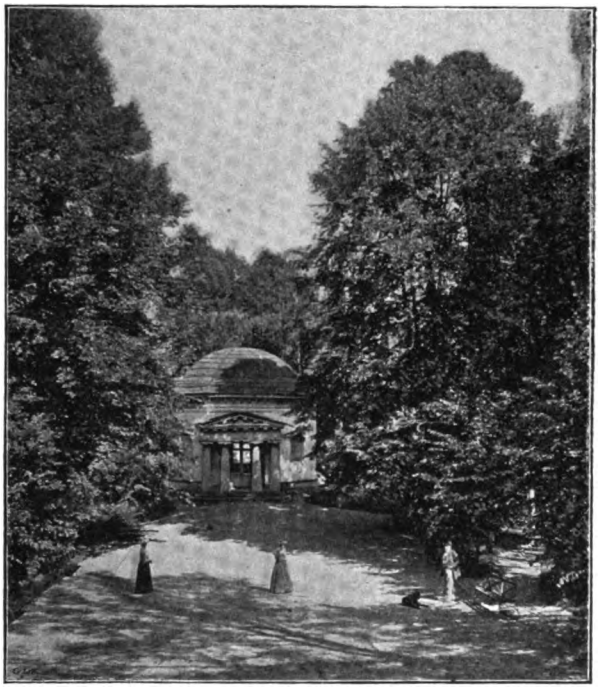
which it afterwards in many cases declined. It is only in modern times that progress has again been made. The French style of gardening is now almost everywhere abandoned, and has given place to the English, or natural, style.

Pomology. The cultivation of fruit-trees can only be carried on successfully in the southern and central provinces. In the valley of Mälaren, orchards are very common, but farther north the cultivation of fruit can only be carried on with complete success in specially favoured localities, and finally, only along the coast. The most northern orchards that still give satisfactory results are in the neighbourhood of Hernösand.

Those kinds of fruit-trees which are most generally cultivated in Sweden are apple, pear, cherry, and plum. Only in Skåne and, as wall-fruit, somewhat farther north, early peaches and apricots can be grown in the open air, but this cultivation is carried on but very sparsely. It is, however, pretty usual in Sweden to grow apricots, peaches, and nectarines — sometimes figs also — under glass. The walnut-tree grows in Skåne, Gotland, and at Kinnekulle, where it attains a very considerable height.



From the Norsborg Park (Södermanland).

The different kinds of apple-trees chiefly grown are: the Alexander, Astrachan, Gravenstein, the Melon-apple, Orange-apple, Ribston, and the Åkerö-apple. It is the general opinion that these sorts of apples when grown in suitable localities in Sweden by far excel similar sorts grown in more southern climates, in taste, keeping qualities, and delicacy of aroma. This circumstance will, no doubt, justify the hope of these sorts of apples becoming in the future an exportable article of importance.

In general, the apple-trees in Sweden bear fruit in abundance. It frequently happens, however, that unfavourable weather, and, still more often, the larvæ of the butterfly cause such injuries that the apples either remain undeveloped, or ripen too late.

Among excellent sorts of native *pears* may be mentioned: the grey pear, the Fullerö, Wennström, Grenna, and Sörmland pears. The climate is less favourable for pears than for apples. Even when cultivated as wall-fruit in the southernmost parts of the country, the native varieties bear no comparison with those from abroad, and the winter pears, especially, often fail.

Cherries of all sorts thrive well as far north as the Dalelfven River, both the acid and sweet varieties sometimes growing wild; and of *plums* a good many varieties are grown.

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Grapes and *peaches* are grown under glass frames in many places in Sweden as far north as the arctic circle, and in Southern Sweden, as also in Gotland, both grapes and walnuts yield ripe fruit on open ground.

Small fruits. The climate of Sweden is especially favourable for fruit-bushes, such as the gooseberry, currant, and raspberry. Only the very early kinds of *gooseberry* can be cultivated to advantage as far north as Luleå and Haparanda, whereas *raspberries* grow wild in the most northern tracts, and therefore can be cultivated there. Blackberries, however, can only be cultivated in the central parts of Sweden, and then but the very earliest kinds. Many hundred varieties of gooseberries as well as a good many kinds of raspberries are cultivated. — Many kinds of *currants*, red as well as black, are grown in Sweden. As something out of the common, it must be mentioned that both red and black currants occur in the most northern parts of Sweden perfectly wild, and it is even supposed that they had their origin in these districts, and have been carried thence to other countries.

Strawberries grow just as well in Sweden as in other countries, the same varieties occurring as elsewhere. During the so-called bare winters, they must, however, be covered with fir-brush, etc., so that the frost may not kill them. Several American sorts, such as Fillmore, Kerr's Prolific, Sharpless, etc., thrive very well in Sweden. Wood-strawberries are pretty generally grown under glass, so as to obtain fruit early.

Culinary Vegetables. The cultivation of culinary plants has in Sweden reached a high standard of perfection both in the open and in hot beds, and is prevalent over the whole country, even north of the arctic circle, where a large number of culinary vegetables reach perfection, such as early white-heart cabbage, cauliflower, early peas, Swedish and the ordinary turnips, beet-root, and many others. In the more populous parts of the country it is carried on on a rather large scale, and, if properly managed, this branch of culture is likely to become a very profitable one, the climate as a general rule being very favourable to similar cultivation. The vegetables chiefly cultivated are: turnips, red-beet, radishes, parsnips, artichokes, onions, cabbage, asparagus, beans and peas, etc. The seeds of vegetables which ripen in the central and northern parts of Sweden are considered to yield the best crops when sown in more southern climates.

The market-gardens of Sweden are preferably located in the vicinity of the larger towns. There are several such gardens in the vicinity of Stockholm, among which may be mentioned: Haga, Ulriksdal, Sundsborg, Enskede, Ådö, Säbyholm, and others. Among market-gardens in the second city of Sweden, Gothenburg, may be mentioned the nurseries of the Gothenburg Garden Society, and of Lagklarebäck.

Floriculture. The cultivation of *flowers* in Sweden has also been brought to a high state of perfection, both in the open air and under glass. As the days of summer are very long, plants both thrive and flower out of doors, and as they are sown early in the spring in hotbeds, the plants are pretty far advanced at the time of being planted out, which is generally done at end of May or beginning of June; thus, very many kinds of flowers can be cultivated which we should scarcely dream of finding under such northern latitudes. It would take too much space to enumerate all or even some of those flowering plants that grow in the open, here in Sweden. Most of the ornamental annuals that are cultivated far more to the south thrive well in the open here, and a goodly number of perennials do the same. Many bedding-plants, as pelargonias, fuchsias, etc., spend the winter in a greenhouse, so that during the summer they may be used for ornamenting the grounds.

The cultivation of plants in pots is pretty much the same as that carried on in the greater part of the rest of Europe.

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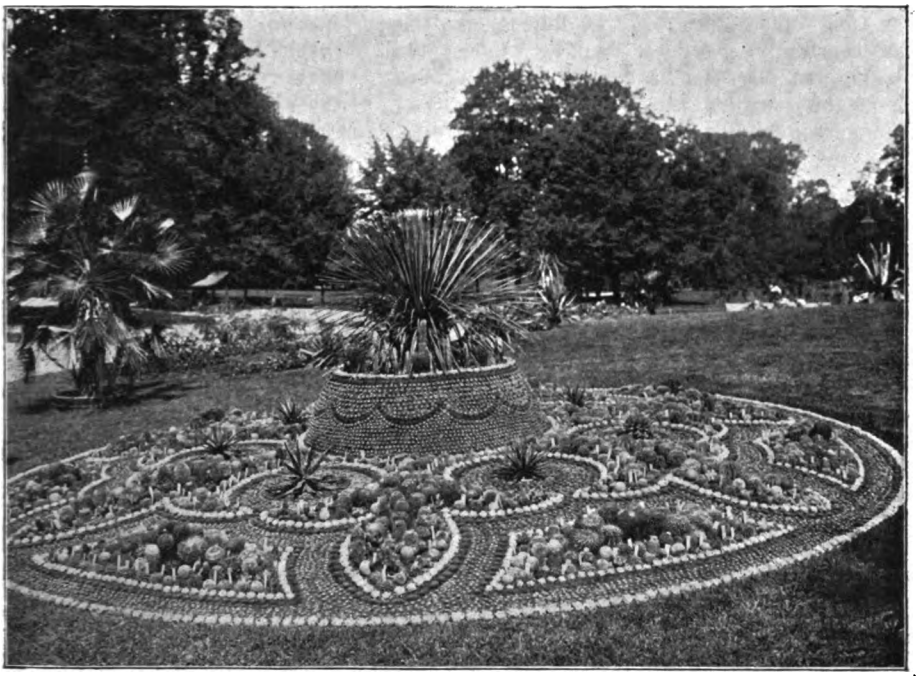

Cactus group at Humlegården (Stockholm).

Arboriculture. A large number of trees and shrubs are cultivated, being partly of foreign origin, many having come from North America. Among the most important, as regards Sweden, are: Acer platanoides, Æsculus hippocastanum, Alnus glutinosa, Alnus incana, Amelanchier Botryapium, Ampelopsis hederacea, Aristolochia Sipho, Betula alba, Betula verrucosa. (Of this latter there is a very beautiful variety peculiar to Sweden, with deeply lobed leaves, which differs in no slight degree from other lobed birches; its name is Betula verrucosa dalecarlica; Swedish: Ornäsbjörk). Further: Caragana arborescens, Carpinus betulus, Cornus, Corylus avellana, Cratægus, Elæagnus argentea, Evonymus europæa, Fagus sylvatica, Fraxinus, Ligustrum vulgare, Lonicera, Mahonia aquifolium, Philadelphus, Prunus (several kinds, as Avium, Mahaleb, Padus, Virginiania, etc.), Ptelea trifoliata, Pterocarya caucasica, Quercus, Rhus, Ribes, Rosa, Rubus, Salix, Sambucus nigra, Sambucus racemosa, Spiræa, Symphoria racemosa, Syringa, some kinds and many varieties, Tilia, Ulmus, several kinds and many varieties, Viburnum, etc.

The public ornamental grounds of Sweden unquestionably bear comparison with those of most other countries. Public parks, of greater or lesser extent, are to be found in almost every town. The most prominent of such grounds are undoubtedly the public parks of Stockholm, Gothenburg, Malmö, Norrköping, and Gefle. In this respect, the capital ranks first, as it can bear comparison with many other larger towns that are situated in far more favourable latitudes.

Nurseries. There are at present in Sweden a good many nursery-gardens, among which may be mentioned the nursery-gardens of the *Swedish Horticultural Society*, those of the *Bergius Gardens* (containing also a large botanical garden), and of the *Academy of Agriculture*. There are such gardens also at Norrköping, Göteborg, Malmö, Halmstad, Helsingborg, Alnarp, Grenna, Lindorms-

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näs, and other places. These nursery-gardens are not only capable of supplying the constantly growing demands of the country for fruit-trees and other nursery plants, but also yield a surplus for exportation. The largest nursery in Sweden is at the so-called *Experimental Grounds* (Experimentalfältet) near Stockholm, belonging to the Royal Academy of Agriculture. The methods employed for propagating trees and bushes, as also their general treatment, are the same as in other countries.

Instruction. Among schools for the training of gardeners may be mentioned the school in connection with the Swedish Horticultural Society, the schools at the Bergius Gardens and at the Experimental Grounds, both near Stockholm, the Agricultural High Schools at Ultuna, near Uppsala, and at Alnarp in Skåne. Moreover, many gardeners are trained both at the Royal Palace Gardens and at other large gardens. The schools at the Experimental Grounds and of the Swedish Horticultural Society, are the chief educational institutions in the kingdom. — Instruction in gardening is also imparted at the lower agricultural schools, distributed over the whole kingdom.

The firmest basis for this branch of culture lies, however, in its being made a subject of popular education. Gardening is taught at the Seminaries for Common School Teachers, and, furthermore, at all Common schools in the kingdom there are *school gardens*, for which purpose the parish must grant the necessary ground. These gardens are to contain the most usual culinary herbs, a few medical plants, an arboretum, etc. The children there learn to work in a garden, and each year receive trees and bushes to plant at their own homes.

Besides the two important *Botanical Gardens* at Uppsala and Lund, which are more especially intended for academical tuition, but are, moreover, of great importance as institutions for testing and acclimatizing, we must not omit to mention the aforesaid Experimental Grounds of the Academy of Agriculture, a large space, where a considerable number of park and fruit-trees and ornamental shrubs are raised, and trials made to acclimatize and utilize them, as well as our kitchen herbs and decorative plants.

Horticultural Societies, to the number of about twenty, spread all over the kingdom, are active in promoting shows, issuing and distributing publications, imparting instruction, and supplying plants and seed. Among such societies may be mentioned the Swedish Horticultural Society (Svenska Trädgårdsföreningen), founded as early as 1832, attached to which is an extensive culture of plants, fruit, and trees; the Gardeners' Society of Stockholm (Stockholms Gartnersällskap); the Skåne Horticultural Society (Skånska Trädgårdsföreningen), at Lund; the Friends of Horticulture (Hortikulturens Vänner), at Gothenburg; and others. The Agricultural Societies employ *master gardeners*, one for each Län, who are to aid the public with advice and information.

The railways, which by their neat buildings have in no slight degree contributed to the improvement of the houses of the peasantry, in the same way have effected untold good by their gardens adjacent to the stations.

As to the **imports and exports** of garden products, we note that the export is of no great consequence, and that among articles of *import* there were, in 1900, living plants to the value of 403,607 kronor, flowers, 253,408 kronor, and flower-bulbs to the value of 300,441 kronor. Cf. Table 78, p. 569.

The process of development which Horticulture has undergone of late years in Sweden is to be attributed not only to increased enlightenment, but also to the example given by a number of large estate owners, on whose land this cultivation has for some time flourished, and to the encouragement given by the Government, Agricultural Societies, and private Associations.

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2. CATTLE-REARING.

Next to agriculture proper, cattle-rearing and dairy-farming are to be counted among the most important of the industries of Sweden. The extensive meadows and the rich forest-pastures supply, too, the most favourable conditions for cattle-rearing in our country. This branch of industry has, however, remained stationary for a long time, and was neglected in many respects. But the last few decades have brought about an immense change, a more comprehensive one, perhaps, than in any other department of our economic life.

In order to find a common expression for the amount of the stock, the different kinds of cattle must be reduced to a unity, in regard to their economic value. In the statistics of Swedish agriculture it has been the custom to convert them into a »reduced number of cattle», in which a horse is counted as = 8/2 of a head of cattle, a sheep = 1/10, a goat = 1/12, a pig = 1/4; besides which, a young horse or head of cattle has been counted as being but half an animal. By using this scale of reduction we obtain the following figures for the total live stock in our country, at different periods, in comparison also with the population:

	Population.	Reduced number of cattle.	Id. per 1,000 inhab.
In 1571	900,000	1,070,000	1,189
» 1805	2,422,000	2,018,000	833
» 1850	3,483,000	2,410,000	692
» 1870	4,169,000	2,622,000	629
» 1900[1]	5,136,000	3,429,000	668

As regards the year 1571, the *relative* number of cattle is calculated by H. FORSSELL (upon whose figures for that year we base our own) as being somewhat higher than that shown here in the Table, his calculations pointing to a smaller population than that given here by guess-work. Thus, in any case it would seem incontrovertible that between 1571 and 1805, the increase in the number of cattle was not, by far, equal to the increase of population, and that the same circumstance has continued during a great part of the 19th century, too. The contrary has been the case, however, during the last thirty years.

With regard to these figures, it must not, however, be forgotten that the *number* of cattle is not the only standard, but that *quality* is a point of view no less important. If we regard this too, the relative decline just mentioned, from the year 1571 to 1870, will be certainly considerably diminished, and the increase, from 1870 to 1900, be of much greater value than the figures given above would lead us to suppose.

If the amount of the stock of cattle be compared with the extent of the *cultivation of cereals* during different periods, the result will be as follows. For every hundred quintals (or 200 cwts.) of cereals harvested about the year 1570, there were kept a »reduced number» of 50 head of cattle. About the year 1800,

[1] Reindeer are also included here, to a number of 232,000, estimated as corresponding to a »reduced» number of 46,400 cattle.

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this relative number had decreased to about 32, and about 1870, all the way to about 15. Since then, the number has, we may say, remained at about the last-named figure. One can plainly see how, through many centuries, the cultivation of cereals was much more attended to than cattle-rearing, while in our days, the care of both finds about equal expression.

The absolute and the relative amount of the number of cattle during different periods, regard being also paid to the different kinds of cattle, may be seen from the table here subjoined (Table 75).

TABLE 75. *Live stock in Sweden at different periods.*

Kinds of Animals.	Total number.				Per 1,000 inhab.		
	In 1571.	In 1805.	In 1850.	In 1900.	1571.	1805.	1900.
Horses	168,000	392,000	380,000	533,000	187	162	103
Cows	420,000	803,000	1,030,000	1,765,000	467	331	344
Other Cattle	378,000	649,000	786,000	818,000	420	268	160
Sheep	560,000	1,216,000	1,550,000	1,261,000	622	502	246
Goats	155,000	140,000	178,000	80,000	172	58	15
Pigs	270,000	400,000	555,000	806,000	300	165	157
Total	**1,951,000**	**3,600,000**	**4,479,000**	**5,263,000**	**2,168**	**1,486**	**1,025**

At the present time, Sweden has, relatively to its population, a larger stock of cattle than most other countries of Western Europe, with exception only as regards sheep and goats. The increasing development of cattle-rearing during later years, is also borne witness to by the following figures, from Table 60, which show Sweden's **imports** and **exports** of cattle and of cattle-farming products, during the period 1871/1900. In yearly averages, the value amounted to:[1]

Averages.	Imports.	Exports.	Surplus of Exports.
In 1871/75	24,852,000 kronor.	14,561,000 kronor.	— 10,291,000 kronor.
» 1876/80	24,785,000 »	16,228,000 »	— 8,557,000 »
» 1881/85	25,697,000 »	25,963,000 »	+ 266,000 »
» 1886/90	22,335,000 »	39,775,000 »	+ 17,440,000 »
» 1891/95	17,150,000 »	51,737,000 »	+ 34,587,000 »
» 1896/00	25,902,000 »	49,768,000 »	+ 23,866,000 »

Thus, while during the first period Sweden imported these products to an annual value of 10 mill. kronor more than the value of the exports, the exports were, instead, in 1896/1900, of the greater value, and exceeded the imports by a sum of 24 mill. kronor annually.

With respect to the total produce of cattle-rearing, the following data, from P. FAHLBECK, may be given. The total number of domestic animals *born* annually may be estimated at 85 % of the number of the cows, 94 % of that of the sheep, 105 % of the goats, and 128 % of the pigs, thus at present annually about 1,500,000 calves, 1,200,000 lambs, 80,000 kids, and 1,000,000 pigs. There is, in addition, an estimated annual number of 25,000 foals. The reduction by *death* (irrespective of slaughtering) is estimated at 2 % of the number of horses kept, 2 1/2 % of that of head of cattle, and 5 % of the number of calves, kids, lambs, and pigs born. There were *slaughtered*, according to the calculations of

[1] A krona = 1·10 shilling or 0·268 dollar.

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the author named, on an average for the years 1885/88, 10,000 horses, 38,000 oxen, 9,000 bulls, 109,000 cows, 9,000 steers and heifers, 997,000 calves, 95,000 goats, 1,232,000 sheep and lambs, and 582,000 pigs. For the *feeding* of the cattle were used annually during 1885/88, 78,000 quintals (à 1·97 cwts.) of wheat, 546,000 quintals of rye, 1,386,000 quintals of barley, 6,002,000 quintals of oats, 1,238,000 quintals of peas, and 347,000 quintals of beans and vetches, or together, 9,597,000 quintals of cereals, which corresponded to 45 % of the total annual cereal-harvest of the country. In addition, there were used 2,506,000 quintals of potatoes, and 1,999,000 quintals of other root-crops. Including hay and other feeding-stuffs, the total value of the cattle-fodder used, was 248 million kronor, or 59 % of the value of the total agricultural produce of the land.

After these short remarks, some attention must now be paid to each of the most important kinds of cattle which are embraced by Swedish cattle-rearing.

Horses.

In 1571, Sweden possessed not far from 200 horses for every thousand of its population, a number which, in 1805, had fallen to about 160 and, by the year 1870, still further decreased to 103. But since then, this decline has ceased, so that in 1900 there were still 103 horses for each thousand of the population.

The last-named figure is a pretty high one, seen from a European point of view, and in the whole of Western Europe there were but Denmark and Finland which could show higher figures. The average for Western Europe is but 55. (But for Eastern Europe about 175).

The total number of horses in Sweden at the close of 1900 amounted to 533,050. Relatively, the greatest number of horses are found in Skåne and Uppland; a detailed view of the local differences is given by the map on page 552. We may now give the following brief account of the history of the horse in Sweden.

We can conclude, from the form of the skull and from what traditions relate, that Sweden's first race of horses came from the East and descends from a Tartaric race of horses still existing in South-Eastern Russia. But in consequence of the incessant inter-breeding with other races, the original type has disappeared, and the inhabitants of the North had, even during the viking-period, active intercourse with foreign lands, when horses were brought home, amongst other booty. It was only during the middle ages and with the development of chivalry that the horse received more consideration and, at the same time, better care and attention. Horse-breeding was embraced with interest on knightly and monasterial estates, and it is probable that the returning knights brought home many a noble horse from the Orient and from Western Europe, which was afterwards used for the improvement of the Swedish horses.

The first steps we know of with certainty for the improvement of horse-breeding, were taken during the time of King Gustavus Vasa (1523/60). He established studs of mares and even riding-schools upon the newly formed royal estates, where he placed Friesland horses he had purchased. During the following centuries, Sweden had to go through many wars and, during these, a great number of horses of different breeds were brought home. We know also that horses

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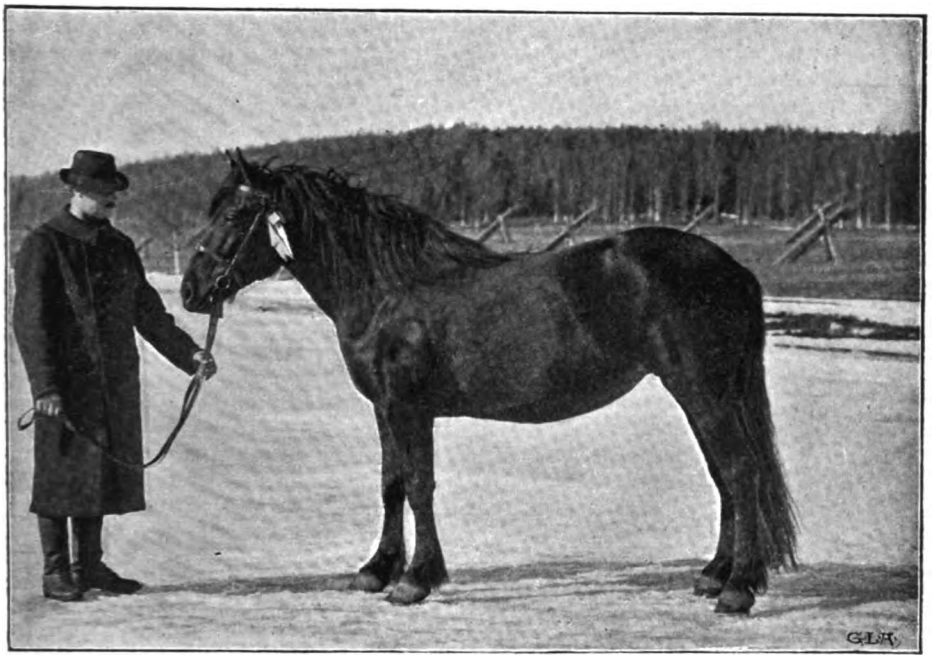
were received as gifts, and were purchased by our Kings and the representatives of our higher nobility. During the 17th century, the Swedish horse does not seem to have been distinguished for size and strength, and the measurement of a full-sized remount was but 138 centimeters, and therefore it is not strange that Gustavus Adolphus had his squadrons strengthened with sharp-shooters, and that Charles XI remounted a great part of his cavalry in the Baltic provinces.



Horse of the North Swedish race.

From time to time also, special regulations were issued intended to improve horse-breeding, but the Swedish horse seems to have been, even at the beginning of the 19th century, of no very superior quality. Then a certain interest seems to have awakened for the import of good breeding animals, and it was natural that such animals of noble race were procured, in the first place, in order to obtain better riding and carriage horses, as agriculture did not yet demand horses of a heavier description. In 1805 two thorough-bred stallions were purchased in London by a private person, which were the first horses of this kind known to have landed in Sweden. After this, there were imported, year after year, breeders more or less adapted for the purpose intended, and it may be mentioned that from 1818 to 1859 there were imported 120 thorough-bred stallions and mares, and 6 stallions and 30 mares of Oriental race.

In the middle of that century, a very great improvement in Swedish agriculture began, and it consequently became necessary to take measures for the improvement of the ordinary farm-horse, which, especially in the central and southern parts of the country, showed itself to be too small and weak for the new agricultural machines and the deeper cultivation of the soil. In order to give the Swedish farm-horse more bulk and strength, breeders of foreign cold-blooded races have been imported and crossed with the farm-horse type, which crossing is still being continued.

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It was not till in the middle of the decade 1841/50 that horses of *Percheron race* were bought, but these soon fell into disrepute, chiefly because only a few were of the pure race, while the greater number were lymphatic, heavy Boulonnaise horses, which had been imported under the title of Percherons.

It was afterwards very justly considered that a breed of horses from a mountainous district would be more suitable for the purpose in view, and therefore people began to import Belgian horses of the *Ardennes race*, and the endeavour has generally been to obtain animals, not too heavy, but with close and powerful forms and good action. This import, which still continues — many Belgian horses arriving annually at Swedish harbours — has had very good influence, and essentially contributed to the improvement of the race of horses in many parts of the country where it has been found suitable to keep cold-blooded horses. The first time an Ardennes horse was publicly shown in Sweden was at the General Swedish Agricultural Show at Malmö, in 1881, where it attracted great attention.

On the same occasion, a *Clydesdale horse* was, for the first time in Sweden, also awarded a prize. A pretty great number of this race have been imported, but the import has declined of late years. In those parts of Skåne where cultivation of sugar-beet is carried on, the Clydesdale horse has won confidence and has proved suitable for the heavy draught-work occurring in the above-named districts.

In the decade beginning 1871, some *Pinzgauer horses* were introduced from the Noric Alp-district in South-Western Austria, but this race proved unsuitable for our country, in as much as the breed grew inferior. Finally, some *Shire-horses*, as they are called, have been brought from England for breeding-purposes, but they have produced a breed of a greatly varying character, in consequence of which the import has recently ceased.

Of late years, the interest in the improvement of the breeding of horses of noble race has shown itself to be greatly on the increase in Sweden. Several oriental horses were imported by King Charles XV, the descendants of which have not proved very prominent, for which reason the breeding is not continued. As in most other countries, so also in Sweden one has learned the great importance of the *English thorough-bred* for the improvement of the breeding of horses of noble race, and from 1866 — when the General Swedish Racing Club was organized, and the interest for sport was awakened — to 1892, the number of thorough-breds in the country increased from 13 to 43, and has continually increased since then, so that, at present, the race numbers about 300. Horses are also imported annually from *East Prussia* and *Hanover*, which have favourably contributed, especially in the southern part of the country, to the improvement of the breeding of horses of noble race.

The studs supported by the Government have been laid down during the last few decades. Strömsholm in Vestmanland in 1872, and Flyinge in Skåne in 1887, were changed to *stallion depots*. The number of stallions at the former place at the end of 1902 was 65, of which 6 were thorough-bred, and 59 half-blood, while at the latter depot there were 93 stallions, of which 9 were thorough-bred and 84 half-blood, besides which there are at Flyinge some twenty young stallions

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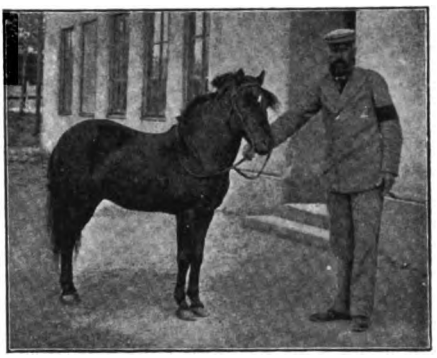
of different races, bought, for the most part, as foals in Hanover, and intended to recruit the numbers of the stallions at the depots. The State military riding-school is at Strömsholm. There are depots for 850 remounts at Utnäslöt, near Strömsholm, and at Herrevadskloster in Skåne.

The chief *private studs* in the country are Tjolöholm in Halland, with thorough-bred and half-blood horses; Brodda in Skåne, with Anglo-Arabian horses; Vidtsköfle in the same province, with half-blood horses; Hagelsberga in Vestmanland, and Blomberg in Vestergötland, with Ardennes horses.

In 1874, the Government began to give **premiums** for horses. According to a regulation of 1900, now in force, the Government gives premiums for thorough-bred oriental and English stallions and also for cold-blooded stallions of certain kinds; but premiums for mares with foals and for young horses, are given out of funds provided partly by the State and partly by County Councils, Agricultural Societies, and private associations.

In 1902, according to the reports of the Stud General Board, premiums were awarded to 479 stallions and 2,085 mares and young horses. The premiums amounted to 206,812 kronor, to which the Agricultural Societies contributed 111,034 kronor. The total expenses of the Agricultural Societies, in 1902, for the promotion of horse-breeding amounted to 189,577 kronor. Those of the State amounted, in 1902, to 255,151 kronor. Total expenses of the Agricultural Societies and the State amounted together to 444,728 kronor. The State-grant for horse premiums used to amount to 50,000 kronor, but, from the beginning of the year 1900, it has been increased to 100,000 kronor.



Gotland pony (›*Russ*‹).

Of late years, a number of *Societies for horse-breeding*, *stallion-studs*, and *foal-companies*, have been established in different parts of the country, which, for the most part, endeavour to promote the breeding of draught-horses by improving them by means of cold-blooded races. Besides the *Northern Stud-Book*, of which 4 volumes have appeared, in which are entered the thorough-bred horses of the country, stud-books are issued by several Läns, both for warm and cold-blooded horses. *Races*, where only gentlemen may ride, are held annually at 10 race-courses under the direction of the Jockey Club and local committees. In 1901, prizes were awarded to the amount of 33,400 kronor, besides 93 prizes of honour, and 3,620 kronor as breeding-prizes. Several *Trotting-Clubs* hold races in the central parts of the country.

But some few decades back, there still existed in the eastern provinces of Sweden a race of horses which in many respects resembled the Tartaric race in Russia. It has now disappeared in consequence of crossing with other breeds.

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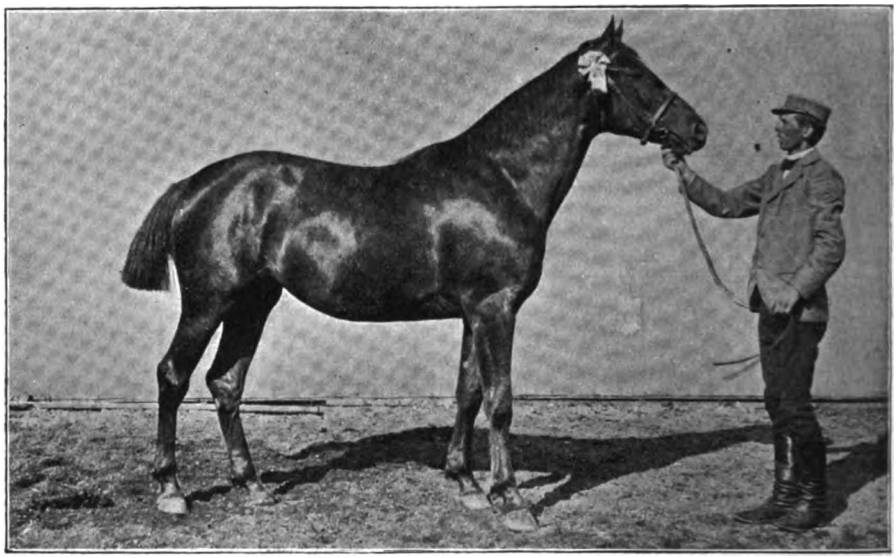
In Norrland and the western provinces there exists a native breed which is also prevalent in Norway, where it is found best and most typically in the districts around Lake Mjösen, and on the southern slopes of the Dovre mountain. Being powerful, with close forms, hardy and contented, this breed, which ought to be called the northern breed, but which is known as the Norwegian, or **North Swedish**, is of great value for the forest and mountainous districts of the country. In many of the northern Läns of the country, premiums are now given for stallions of the above-named race only.

There formerly existed in great numbers on the island of Gotland the small horses called »Russar», but they gradually disappeared in consequence of the »re-parceling» (see p. 512), so that at present they are only few in number.



Skåne half-blood horse.

In Vestergötland and in several other provinces, the farm-horse is the result of a crossing with the Ardennes breed, which is employed more and more for the improvement of the farm-horse in the central and southern parts of the country. The breeding of horses of noble race flourishes best in Skåne, but good warm-blooded animals are also bred elsewhere in the country. This branch of horse-breeding has, however, of late been superseded in places where it was formerly carried on with interest, by the breeding of cold-blooded draught-horses, less difficult and not requiring such thorough knowledge of the subject. The cultivation of noble breeds has, however, been making progress in certain districts, owing partly to an increased demand for remounts.

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TABLE 76. *Imports and exports of Live Stock. By heads.*

Average for the years	Horses.		Cattle.		Sheep and goats.		Pigs.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1866/70.....	665	1,336	233	15,415	193	7,919	580	8,659
1871/75.....	1,582	2,218	662	20,107	208	17,694	2,822	16,044
1876/80.....	2,179	1,516	2,049	27,530	337	22,939	4,467	16,565
1881/85.....	3,055	2,664	3,213	31,870	808	29,156	6,276	32,206
1886/90.....	1,308	2,986	3,632	32,861	877	36,190	5,219	13,855
1891/95.....	1,060	2,715	2,372	19,671	339	10,201	620	2,041
1896/00.....	1,961	1,716	2,068	10,075	108	5,543	759	4,554
In 1900.....	2,410	1,420	1,772	3,820	95	2,687	414	116

Much has been done by the Government and by private individuals to improve horse-breeding in Sweden, but, as a rule, a definite plan has been wanting in the work, and experiments have been made with a number of foreign breeds, of which many have shown themselves as not adapted to the conditions of the country. It is but of late years that the views on the subject have become settled, and that definite ends have been adopted for breeding in different places; the time should, consequently, not be far distant — considering the great interest with which horse-breeding is now embraced — when Sweden will have conform breeds of horses, fit for the uses intended, an honour to the country and the breeders, and sought for in the markets of the world. — Some figures concerning Sweden's *imports* and *exports* of horses are given in Table 76.

Cattle.

If confidence can be placed in the figures for the 16th century, which are given in Table 75, page 550, Sweden should have possessed at that distant time nearly one head of cattle for each of the inhabitants of the country. In our days the relative figure is only about half as large. If we regard only the number of *cows*, no diminution has taken place during the whole of the 19th century, and while the *total* has thus been fully maintained, the *quality* of the stock has very considerably improved.

In general, Sweden is especially rich in cattle, so that out of all the countries of Western Europe it is surpassed only by Denmark and Finland, while Norway is about equal to Sweden. The four northern countries thus occupy the foremost place in this respect in the western half of our quarter of the globe. The relative number of cows in the different parts of Sweden is shown by the map on page 558, which embraces the frequency within every *hundred*, for the year 1889.

The history of cattle in our country presents a good many vicissitudes. The Law of Uppland, A. D. 1296, describes Swedish cattle as being small, hornless, white or whitish grey, often with dark spots. The *Alpine* breed in Northern Sweden

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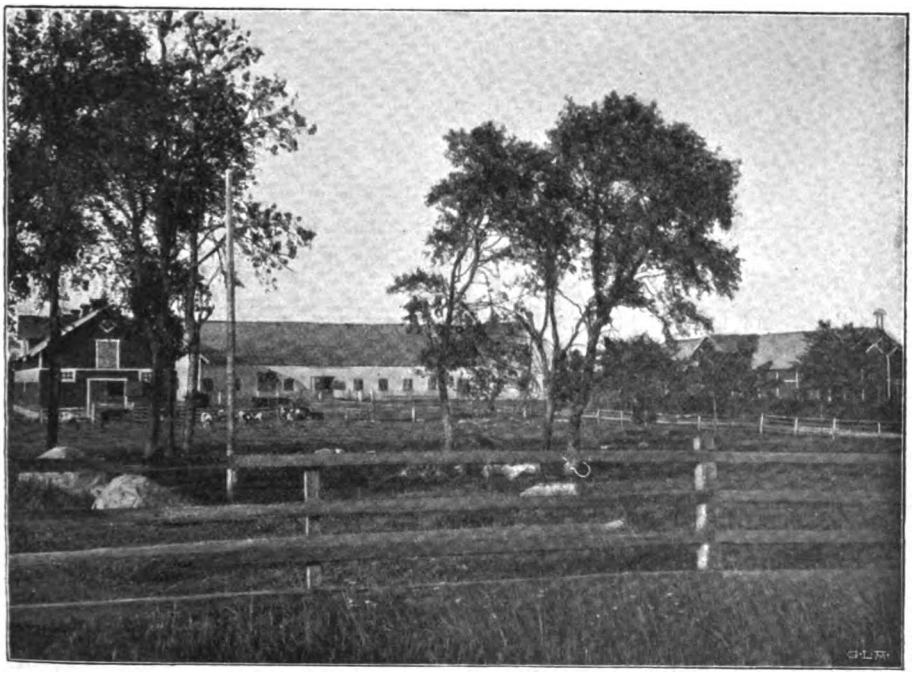
is so still, a race we have every reason to consider as being the oldest in the country. But at an early date there came into the country — probably from the East — a larger *horned* race of cattle, reddish-yellow in colour, which towards the North more and more invaded the districts of the older race. This race has by degrees become crossed with, and in many places replaced by, purely foreign breeds, but it long survived typically in the forest-districts of Småland, and is still found in the island of Gotland.

We find few notices of steps taken for the promotion of cattle-breeding during the middle ages, but we know that cattle were exported in large numbers from Småland and several other provinces. During the energetic reign of Gustavus Vasa (1523/60), steps commenced to be taken to improve cattle-breeding, and *Dutch* cattle were imported by the King in question for his own estates. There were large numbers upon these estates and those of the higher nobility. The greatest herd was that on the estate of Gripsholm, numbering 645 head of cattle. After the death of King Gustavus, the breeding of cattle seems to have continuously declined, and it was only during the 19th century that Swedish farmers learned the importance of cattle-rearing for remunerative farming. This interest commenced, however, in certain districts during the preceding century, so that cattle of foreign breeds were imported to estates in Skåne, both from Denmark, Holland, and England. As early as 1743, *Jonas Alströmer* — the great patriot, whose activity became of such an importance to the industry of Sweden — procured cattle from England for his estate of Höjentorp in Vestergötland, and in many publications the advice was given to pay better care and attention to cattle than was usually done. The incessant wars during the 17th and the beginning of the 18th centuries, together with the cattle-plague, which, from 1745 to 1786, destroyed many herds in different provinces, were the chief causes of the absence of a more general interest in cattle-breeding.



Farmyard of an estate in Central Sweden.

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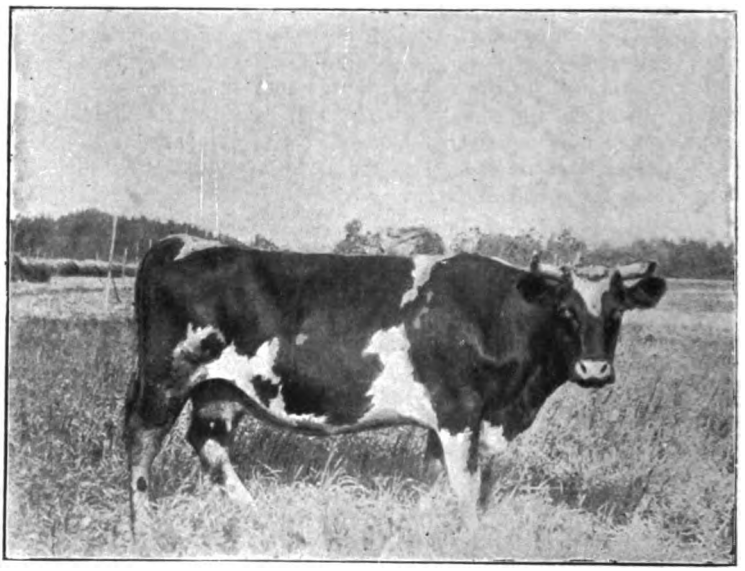
Some time after 1830, *Alexis Noring* returned to Sweden after having spent many years in England in the study of farming and the breeding of domestic animals. He described English conditions with all the warmth of youth, and he succeeded in interesting several landed proprietors of Southern Sweden in an improved system of breeding domestic animals. A pretty large number of animals, and amongst them several breeds of cattle, were purchased by Noring from abroad, chiefly for estates in Skåne.

In general, the opinion was held that Swedish cattle, in order to get larger and more milk-giving, should be crossed with foreign breeds, and several fine stocks (»*estate-breeds*») were produced both in Southern and in Central Sweden, as the result of the importations during the preceding century, and of carefully directed breeding. Interest in the matter was still kept up by private farmers, and material for improvement of their breeds was sought for in England and along the coasts of the North Sea, from Jutland to Holland.



Cow of the red-and-white Swedish race.

It was not until 1844 that the **Government** powerfully intervened in order to improve Swedish cattle-breeding, when the Riksdag voted 105,000 kronor for the purchase of breeders, which were to be stationed on suitable estates and form *stock-breeding farms*, from which breeders should be sold to private farmers. In accordance with the then prevalent taste for foreign animals, eight stock-herds were bought, viz., four of the *Ayrshire*, two of the *Pembroke*, one of the *Voigtland*, and one of the *Algau breed*, each herd consisting of 20 cows and 2 bulls, which were placed each in its special district. Curiously enough, no stock-breeding farm of Swedish animals was established. From 1859/67, the Government gave a further grant of about 100,000 kronor for the purchase of good breeders and for the establishment of such stock-farms, but, in spite of that, these farms began to decrease, so that the last were broken up and the animals sold, in 1871. The breeds imported had shown themselves, with the exception of the Ayrshires, unsuitable to Swedish conditions, and sickness had appeared, too, amongst animals of the breed just mentioned. In 1864, a breeding-stock of *short-horns* was established at Alnarp, which is still existing.

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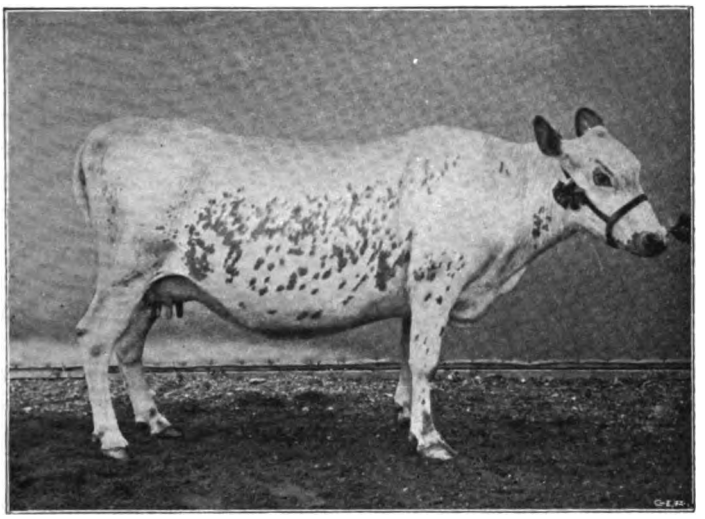
The money obtained by the sale of the breeding-stocks of cattle and sheep owned by the State, now forms a fund from which prizes of honour to an amount of 10,000 kronor are distributed at the General Swedish Agricultural Shows for the finest herds of cattle and flocks of sheep.

During the period just mentioned many breeding-stock farms were established by private persons and by agricultural societies, with animals of several different breeds; some of these farms have been of great use, others again of little value.

After the Ayrshire breed had fallen into some discredit owing to its susceptibility to sickness, the black-and-white cattle from *Holland* came into fashion and were soon widely spread throughout the country. Experience has shown, however, that this breed is not in general suitable for the climate and nature of Central Sweden, and still less for that of the northern part of the country, for which reason it is kept at present principally in Skåne.



Cow of the Swedish Alpine race.

Of late years the interest in the improvement of cattle has been pretty lively in our country. An important step in this direction has been taken by the introduction of a *regular system of prizes*, by which means greater regularity in breeding has been brought about in different parts of the country and an inducement occasioned to keep only such breeds of cattle as are suitable for the different districts. A special account of this question is given below, on page 564.

Attention was also drawn by degrees to the fact that on many estates there were conform breeds worth improving. These breeds had sprung up by crossing the Swedish red cattle with foreign races, amongst which the short-horned variety must be considered as having been the most active. In 1892, a great number of farmers in Central Sweden formed the **Society for the breeding of Red-and-white Swedish cattle,** for the purpose of searching out and perpetuating the breeding-material in the country consisting of red-and-white milkers, and, by

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systematic selection, to work for the improvement of this material into a constant race possessing high milking properties, as well as awakening an interest in, and spreading a knowledge of the rational treatment and improvement of cattle. The breed at Stjernsund in Nerike, which is the result of crossing the long-valued Vallaholm race with Shorthorns, was taken as a standard for the race.

The very year after the establishment of the society, 62 bulls and 788 cows were registered in its Herd-Books. These figures have been steadily increasing; in 1903 they amounted to 215 bulls and 2,838 cows. In order still further to improve the breeding of cattle, and to attain regularity in the system, bull-societies have been formed in many places, in most of the Läns.

Ayrshire cow.

At the present time the following **breeds of cattle** are those most generally spread in Sweden: the *Alpine race* in Norrland, where in many Läns it is the only type admitted to competitions; the *Ayrshire* in the central and southern parts of the country, where the *Shorthorn* herds are also found upon many estates; the *Red-and-white Swedish cattle*, more or less resembling the Shorthorn or Ayrshire types, are spread throughout the central part of Sweden; the *Lowland cattle*, principally *East Frisian*, are found best developed in Skåne; finally, the old light-yellow Swedish race is found under the name of the *Gotland breed* on the island of Gotland, where an attempt is being made to improve it by pure breeding. There are, besides, excellent herds of red Danish cattle in Halland; Jersey cattle, of which some breeds have been imported during the last decade; and, on some estates, the Algau race. Naturally, there are everywhere found in the country products of all possible and impossible crossings, which are a consequence of that want of order which prevailed in the direction of cattle-breeding before the organization of the prize-giving system.

As late as in the decade 1851/60, the *imports* of dairy-farm produce were still pretty large, so that on an average, during the years 1854/58, there were imported 510,100 kilograms of butter, 425,100 kilograms of cheese, and 2,300 head of cattle, whilst cereals were exported. In the

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TABLE 77. *Imports and exports of Meat and pork. By quintals à 1·97 cwts.*

Average for the years	Meat.		Pork.		Sausage.		Total.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1861/65	4,419	452	15,273	471	403	1	20,095	924
1866/70	4,037	1,228	9,406	1,152	175	1	13,618	2,381
1871/75	7,486	1,313	74,911	2,325	363	19	82,760	3,657
1876/80	11,635	1,246	131,125	1,081	348	151	143,108	2,478
1881/85	15,414	1,739	85,502	4,849	202	217	101,118	6,805
1886/90	14,434	2,098	72,069	45,752	149	607	86,652	48,457
1891/95	8,800	5,665	58,919	69,545	141	692	67,860	75,902
1896/00	11,522	3,610	98,081	36,210	84	269	109,687	40,089
In 1900	15,086	2,138	106,748	12,214	62	11	121,896	14,363

decade of 1861/1870, Sweden began to *export* butter (see Table 79, p. 571), and since that time the import of cattle decreased simultaneously with the appearance of Swedish cattle in foreign markets. As early as 1853 endeavours were made both in Skåne and Gothenburg for the export of cattle to Denmark and England. In 1865, the export had become a paying business, which for a time was increasing.

It now seemed as if Swedish cattle-breeding had a good future before it, and that it would be able to gain a sufficiently large market for its produce, principally in England but also in Germany. But in consequence of the order issued by the English authorities in 1892 against the introduction to Great Britain of live cattle, and of the legal regulations which, since 1895, render the import of cattle into Germany difficult, the breeding of cattle has, however, been checked to a very considerable degree. At present, attempts are being made to bring about a well-organized *export of meat*, and slaughter-houses for the purpose are beginning to be erected in many towns along the coast. Respecting the imports and exports of meat, see Table 77. Most of the great amount of meat imported comes from America, and includes a great quantity of salt horse-flesh that we might do without.

In Sweden, as in most other European countries, *tuberculosis* occurs amongst the cattle. Great efforts are now being made to combat the disease and to obtain perfectly healthy breeds of cattle. It is only exceptionally that tuberculosis has been found among the cattle of Norrland, and many breeds in the central and southern parts of the country that have been examined by the aid of tuberculine, have not shown any reaction.

Finally, we give some data concerning the *number of cattle in Sweden of late years*, distinguishing between oxen, bulls, cows, and cattle under two years of age:

	Oxen.	Bulls.	Cows.	Young cattle.	Total.
In 1870	269,762	38,647	1,231,477	426,014	**1,965,900**
» 1880	289,071	47,985	1,409,236	481,465	**2,227,757**
» 1890	253,735	49,066	1,578,927	517,763	**2,399,491**
» 1900	218,932	51,390	1,764,819	547,414	**2,582,555**

These figures show that the breeding of cattle goes steadily forward. The number of oxen has, however, constantly decreased, horses being nowadays more and more used in agriculture, and it is actually the number of cows that has increased.

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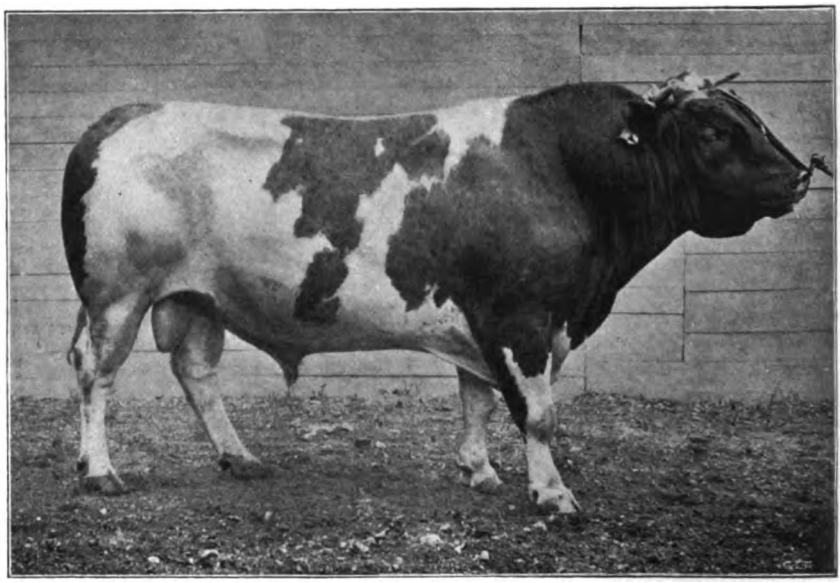
That, however, not only the number of cows and of cattle has in general increased, but that their quality has also been highly improved, has already been shown in detail. Amongst the measures which have most contributed to this fact, is the before mentioned **organized arrangement of prize-competitions.** This question having been the subject of great attention, and deservedly so in every respect, a somewhat more detailed account of the matter may here find a place.



Lowland bull.

Measures of different kinds have been taken in our country in past times to improve cattle-breeding, and to awaken interest in the matter. A considerable time elapsed, however, before any method of procedure was found which showed itself to be quite suitable for Swedish conditions; the first system of which this could be said was the one elaborated by Captain *Sigge Flach* (which was adopted in 1882 by the Agricultural Society of the Län of Skaraborg) for prize-competitions of cattle, which, better than any other, proved itself able to carry with it the great mass of the small farmers of the country too, in the work of raising the breeding of cattle. Particularly simple in its plan, it rests upon practical, well considered principles, which is best proved by the fact that, even before the State had voted the slightest contribution to cover the expenses, it had been adopted with success in 17 different Läns; in 1892, when the State for the first time voted a grant, this number rose at once to 25, and during the last years, prize-competitions upon the **Skaraborg system,** as it is nowadays commonly called, are annually held by *all* the 26 Agricultural Societies of Sweden. From

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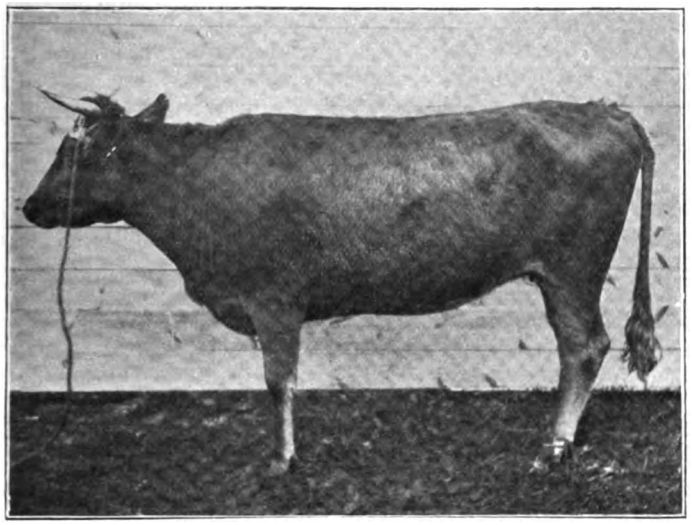
1898, the annual State grant has amounted to 75,000 kronor, a sum which, however, only constitutes a fraction of the whole of the expenses which, in 1901, amounted to a total of 212,075 kronor.

Most of the Agricultural Societies have divided their districts, on account of these prize-competitions, into *two divisions*, in which competitions are held by turns every other year. The prizes are awarded by a *jury*, the chairman of which is appointed by the Board of Agriculture upon the proposition of the Committee of the respective Agricultural Societies; the Committee itself chooses one of the jury, who is also treasurer; together with these two persons, who officiate throughout the whole of the Län, a third member also enters the jury at every competition, chosen by the sub-division of the Society within whose district the competition is being held. As the number of competition-places within each district is comparatively large (from 20 to 25), the different exhibition-districts become so small that every one can easily avail himself of the result of the exhibition and the judgment passed.



Gotland cow.

The right to compete for prizes awarded for *female cattle* (cows and heifers from 1 1/2—10 years old) is restricted to owners or tenants of, at the most, 50 hectares of land, while on the contrary the competition for bulls is open to all. Besides medals of different kinds for bulls, and prizes of varying amounts for female cattle, every one of the latter is also given a so-called *free-ticket* entitling the animal to a free covering by a prize-bull. As the prize-jury redeems these free-tickets at a price of from 2—6 kronor each, according to the quality of the bull, the owners of bulls are incited to win prizes for their animals. Even for cows that have not won prizes at the time when they are covered by a prize-bull, the jury pays the same covering-fee when the cows have been exhibited and have taken a prize, if a certificate is given showing that they have been covered by a prize-bull within a certain time before the cows take prizes. Moreover, at these prize-exhibitions, each animal is branded with a mark of approval, which can also be regarded as a kind of reward, as importance is often

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attached to this fact at the sale of cattle, especially when these are purchased for another person. An animal which has once taken a prize of money cannot, true enough, gain another in the same class, but, until it has reached 10 years of age, it can be exhibited at each competition in order to obtain a fresh free-ticket. After the close of the competition, it is a custom that one of the jury delivers a short *lecture* on it to the public, giving advice and directions concerning the feeding and the care of cattle, etc; a lecture which has proved of great value, especially by the access which it offers at the place to living illustrations of the lecture.

This short account of our Swedish system of prize-competitions shows how an effort is made to benefit the small farmers and to excite their interest in an improved system of breeding. Especially by means of the free-tickets and the regulations concerning them successful efforts have been made to bring about co-operation between the large and small farmers of the country, in the one case by trying to induce the former to procure good bulls, by means of offering them greater advantages than can be obtained merely by the use of a good bull for their own cows, and, in the second case, by taking such measures that the small farmer can have the same advantages of a large-farm bull as the owner of the animal, without it costing him a single farthing. But although the advantages obtained by the use of the free-tickets are, consequently, not small, experience has shown, however, that only about 60 % are presented to be redeemed, a thing against which successful measures have been taken in many Läns by the perforation of the free-ticket into two parts, of which the owner of the cow keeps one — redeemed by the committee for a certain sum, usually 1 krona — giving the other part to the owner of the bull, who receives it as his share. A number of Agricultural Societies have also tried to make it easier to procure good bulls by buying such animals and making them over to interested persons, to be paid for usually by 5 yearly instalments, free of interest. As the instalments in question are usually paid by means of free-tickets, a valuable animal can, in this way, be obtained without any cash payment at all.

The annual increase in the number of animals exhibited is a speaking witness of the lively interest with which these competitions are embraced. During the last years of the decade 1881/90, when the competitions were confined to only 13 Agricultural Societies, the number kept at about 10,000; whereas now, there are exhibited, within twice the number of competition-districts, about four times as many animals. (In 1901 there were 38,807 head exhibited). Of this number about 75 % are approved of, on an average.

A complete view of the progress of cattle-breeding in Sweden in our days is gained by a study of our **Dairy-farming,** which has now become of such great importance in the country that we must give a special and detailed description of it, to be found in the article on page 571.

Sheep.

Sheep form one of the kinds of cattle in which Sweden is not especially rich, as compared with the other countries of Western Europe. While these countries have, on an average, 400 sheep for every thousand of the population, Sweden reckons but 250, and, in comparison with former times, this proportion in Sweden has greatly diminished, as may be seen from Table 75, page 550.

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Respecting the measures taken at different times for the improvement of sheep-breeding in our country, some account is given in the division treating of the Wool Industry, which follows. At present, Oxfordshiredowns, Shropshires, and Southdowns seem to be considered the best sheep for more fertile, and Cheviots the most suitable for more barren tracts. *Gotland* has since the middle ages had a highly developed system of sheep-breeding, the produce of which formed one of the chief articles of export from the island. The sheep were kept, partly domesticated, and partly allowed to run wild during the whole year, and these were captured merely for the purposes of marking, of shearing, or of being turned into mutton. Such wild sheep are still to be found upon the islands of Fårön, Stora Karlsö, and Sandön. The Gotland sheep-breeding has been improved by crossing with Cheviots, and the State has a sheep breeding-farm of this breed at Roma.

Table 75 has already shown that the *number* of sheep has greatly diminished since olden times, and the same holds good in our days. In 1870, Sweden possessed about 1,600,000 sheep, but in 1900 only 1,260,000. The chief cause of this condition of things is the growing interest for cattle-breeding, a more thorough cultivation of the land, and the difficulty of fencing small flocks of sheep.

Remarkably enough, the *export-figures*, as may be seen by Table 76, long showed a continuous increase. During late years, however, the export of living sheep has again decreased, while, on the contrary, no small amount of mutton is exported. The import of living sheep has, besides that of breeding-animals from England, consisted in sheep for slaughter from Finland. The export has consisted of sheep for slaughter to England, partly direct, partly via Denmark.

Goats.

Like our other domestic animals, the goat existed in Sweden in pre-historic times and possessed, even in the middle of the 18th century, such importance that a prominent author wrote, »Next to sheep, I justly give goats the preference to all other domestic animals». Angora and Cashmere goats were imported for the purpose of improving goat-breeding, which, however, has more and more declined. The goat, »the poor man's cow», is despised more than it deserves to be. Its desire to destroy plantations and its disregard of fences have been the cause of its disappearance from most provinces. — As to the number of goats in olden times, see Table 75. In 1840 the stock amounted to about 200,000 head, but has continually decreased, at present to but about 80,000. More than 50 % of the whole number are kept in Dalarne and Jemtland.

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Pigs.

Pig-breeding in Sweden has had periods both of increase and decrease. A period of decrease seems to have followed the middle of last century, but, on the other hand, the last two decades have been characterized by a great increase, standing in connection with the revival in dairy-farming. There are, on an average, in Western Europe about 160 pigs for every thousand of the population, and the figures for Sweden are, at present, just the same.

From olden times pork has been a valued article of food in our country. The old northern mythology lets the Asar eat the flesh of the ever self-rejuvenating boar, Serimner. During the »midwinter-feast», or Yule, in the heathen days, a festival was held to greet the winter and to sacrifice to Frö, when a boar was offered; the memory of this custom still survives in that of decorating the Christmas table with a Yule-pig, or Yule-ham. Many regulations exist from the middle ages concerning the feeding of pigs in the extensive beech and oak forests which then existed. A considerable breeding of pigs was carried on upon the royal estates and other large properties, but as little is said by chroniclers about the shape of the pigs as there is of the measures taken during the succeeding centuries for the improvement of pig-breeding. As we have just said, it is really since the revival of dairy-farming that our farmers have learnt to see the importance of improving the old Swedish race of pigs, by crossing with quickly growing and easily fed foreign breeds, as also of keeping animals of pure blood.

Experiments have been made in our country with several different breeds, such as of Yorkshire, Berkshire, and Tamworth pigs, but at present the large Yorkshire pig is that which is most generally found. The most prominent breeds are owned by F. M. Mohn, at Remmene, in Vermland, and P. Bondesson, at Svalöf, in Skåne.

The whole number of pigs has increased from 354,000 in 1870 to 806,000 in 1900: both numbers probably short of reality, but they give at least an idea of the proportion in the increase. At the same time the quality of the animal has greatly improved. These circumstances are also shown by the statistics of imports and exports, some data of which, as to living animals, are given in Table 76, and for the pork-trade in Table 77. The unfavourable export-figures of the last few years depend *partly* upon a couple of years' poor oat-crops.

Poultry-breeding and Apiculture.

Poultry-breeding. Even during pre-historic times, fowls and geese were kept in Sweden, but ducks first became domesticated towards the close of the Middle Ages. The turkey was brought to Sweden at the commencement of the 17th century. The hen-roost and the goose-pen were ordinary parts of the furniture of an ancient northern cottage, and in many parts of the country they have been retained far into the last century; nowadays, the feathered inhabitants of the cottage have, almost everywhere, been relegated to the barn-yard.

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TABLE 78. *Imports and exports of certain minor agricultural products.*

Average for the years	Living plants.* Value in kronor.		Eggs. In scores.		Honey. Kilograms.		Wax. Kilograms.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1871/80.....	108,381	5,517	46,707	148,320	1,233	263	4,711	12,688
1881/90.....	352,612	13,904	119,915	337,697	6,882	784	13,814	11,935
1891/95.....	620,214	33,951	283,246	820,846	12,284	821	6,916	11,010
1896/00.....	786,503	32,003	1,654,137	392,690	17,613	664	13,178	5,573
In 1898.....	777,100	26,292	1,367,595	360,797	19,253	—	15,257	4,194
» 1899.....	817,712	34,591	2,194,317	210,310	26,142	243	14,765	6,288
» 1900.....	957,456	53,286	3,188,510	145,053	14,847	—	15,980	5,822

The total number of cocks and hens in our land is calculated as being at present about 3 millions. In general, poultry-breeding is not especially flourishing in Sweden. There exists, however, paying goose-breeding in Skåne and Öland, and in autumn a considerable number of geese are sent from the provinces mentioned to other parts of the country and to Denmark.

A number of different breeds of fowls have been brought into Sweden, amongst which Leghorns and Plymouth-Rocks have won the greatest reputation. The interest in poultry-breeding seems to be on the increase, and the »Society for poultry-breeding» tries in many ways to distribute good breeders and to spread a knowledge of the necessary arrangements for a paying system of breeding. In 1898, a new society was established, »The Society of poultry-breeders in Sweden», with a great number of members from different parts of the country. If it obtains the support desired, it ought to be able to work successfully for the establishment of poultry-breeding as a lucrative occupation, many districts in Sweden being especially suitable for it. A prominent specialist has calculated that Sweden should be easily able to produce eggs to the value of several tens of million kronor. The present production is estimated at 12 million score per year.

Eggs are *exported* chiefly from the eastern and south-eastern provinces to England, direct or via Denmark and Norway. Figures for earlier and later years are given in Table 78. The *import* of eggs has, of late years, much exceeded the export; the eggs come chiefly from Russia, Finland, and Denmark.

Apiculture. The inhabitants of Sweden have used honey from time immemorial as a luxury, and regulations are found in the old provincial laws concerning the ownership of forest-bees. When, afterwards, wax-candles were used for the high-altar and before the images of saints, and as honey was a necessary ingredient of many dishes and for the preparation of mead, apiculture developed to a paying industry. Mead was, in olden times, »the favourite drink of gods and of men». But when sugar came more and more into use, apiculture declined very much. And although several measures have been taken in the last century to awaken interest in apiculture, and many agricultural societies contribute money for the promotion of the industry, the bee-hive becomes rarer and rarer in the gardens both of large farms and of cottages. There are, however, in the country specialists who pursue apiculture on a large scale and with profit. Bee-swarms and queens have, too, been largely imported from abroad in order to form more fertile swarms. — The total number of bee-swarms in Sweden is at present calculated at about 100,000, and the yearly production of honey at 1/2 million kilog., and of wax at 10,000 kilog. A view of the exports and imports of honey and wax is given in Table 78.

* Including flowers and bulbs. A krona = 1·10 shilling or 0·268 dollar.

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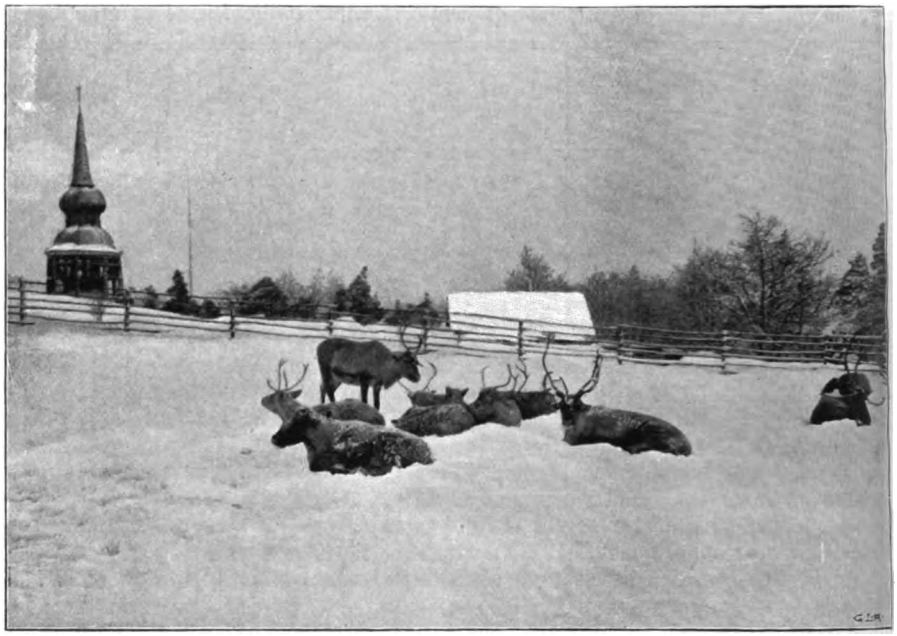

Reindeer at the Skansen Museum in Stockholm.

Reindeer-breeding.

An altogether special kind of cattle-breeding, without any connection with that pursued elsewhere in Sweden, is the reindeer-breeding carried on by the *Lapps*, this small nomadic people — at present consisting of but a few thousands of individuals — concerning which an account is given in the foregoing, p. 166. For the Lapp, the reindeer is a necessary condition of life. He is carried by it across the snow-covered fells, amid the winter-night illumined by the northern light. He gains his principal food from the flesh and milk of the reindeer, he makes his clothes of its hide, sewing them by means of thread made from its sinews, and, finally, he makes domestic utensils of its bones and horns. In former days, the Lapps were the sole masters of the northern alpine regions in our country, with the large adjoining moors and forests. But simultaneously with the close approach of culture to the North, the pasture-lands of the Lapps have also been restricted, and the number of nomadic Lapps has decreased. In consequence of this, reindeer-breeding has also decreased, to which, moreover, the fact has contributed that the Lapps not so freely as formerly can drive their herds across the borders of Norway and Finland. — In 1890 the total number of reindeer was 296,220, of which 203,170, or 69 % were found within the Län of Norrbotten, and the rest within those of Vesterbotten and Jemtland. The number of reindeer is decreasing, so that in 1900 they amounted to but 231,960. As there are but a few hundreds of reindeer owners, the average number of animals in each reindeer herd is found to be very considerable.

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3. DAIRIES AND DAIRY-FARMING.

Dairy-farming in Sweden has a history extending over well-nigh seven centuries. At the close of the 16th century cattle-rearing and the production of butter and cheese were important and remunerative branches of industry, though after that time stagnation and retrogression set in, and it was not until within the past 30 or 40 years that dairying again became one of the best and most lucrative branches of farming in Sweden.

Amount of Milk Produced. All the animals classed in the official statistics under the heading of *cows*, that is to say, all females of two years or upwards, cannot be counted as milk-yielding, only about 85 % of them, probably, being actually in milk. The stock of milk cows has annually increased during the past decades, but the power of yielding has also been constantly improved by means of more careful culture, and selection of breed, closer attention to the principles of scientific feeding, and superior tending in various ways. In 1875 the average annual yield of all the cows actually in milk cannot, probably, be estimated as having exceeded 1,200 kilograms, in 1885, however, it was probably 1,400 kilograms, while at present it is 1,800 kilograms. On this estimate the supply of milk in the country for the whole year may be calculated in round numbers as amounting in 1875 to 1,400 million kilograms, in 1885 to 1,850 million kilograms, in 1895 to 2,450 million kilograms, and in 1900 to 2,750 million kilograms. At the price of 7 öre per kilogram the gross value of the milk produced in the country annually would at present be about 192·5 million kronor.

The Uses to which the Milk is applied. Milk is used for human food, for the rearing and fattening af calves and other young animals, and also in the production of butter and cheese. In Sweden there is no production of preserved milk in any form, or of milk-powder, etc., nor are milk and cream exported from the country to any appreciable extent. The quantities that are allotted to each of the above given uses, to which milk is applied, can only be given very roughly.

TABLE 79. *Sweden's imports and exports of Butter and cheese.*
Kilograms à 2·204 lbs.

Average for the years	Imports and exports of Butter.				Imp. and exp. of Cheese.		
	Imports.	Exports.	Excess of imports (—) or exports (+).	Per inhabitant.	Imports.	Exports.	Excess of imports.
1801/10 ...	38,420	3,570	— 34,850	— 0·01	328,770	13,720	315,050
1811/20 ...	284,680	16,070	— 268,610	— 0·19	261,370	7,290	254,080
1821/30 ...	844,910	14,290	— 830,620	— 0·80	284,700	500	284,200
1831/40 ...	726,460	7,520	— 718,940	— 0·24	157,370	790	156,580
1841/50 ...	230,500	11,130	— 219,370	— 0·07	80,460	840	79,620
1851/60 ...	432,580	19,110	— 413,470	— 0·11	372,290	7,800	364,490
1861/70 ...	1,209,760	661,060	— 548,700	— 0·13	419,770	59,910	359,860
1871/80 ...	1,960,390	3,674,910	+ 1,714,520	+ 0·39	615,360	147,100	468,260
1881/90 ...	2,521,350	11,057,880	+ 8,536,530	+ 1·83	395,080	158,330	236,750
1891/00 ...	730,258	21,142,549	+ 20,412,291	+ 4·14	258,320	102,300	156,020
In 1900 ...	497,450	19,162,783	+ 18,665,333	+ 3·65	322,323	4,155	318,168

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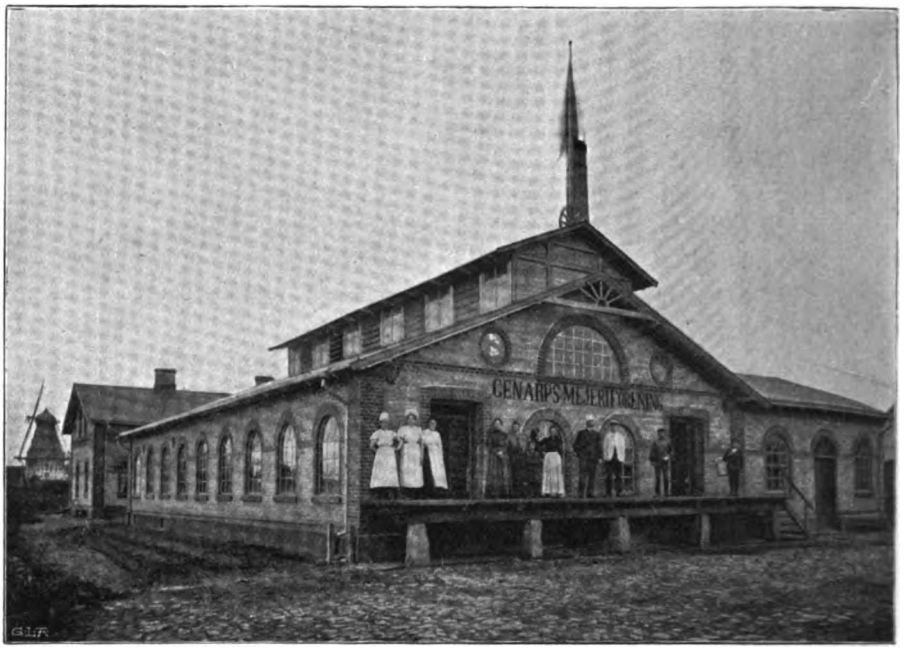

Co-operative dairy (for 10,000 à 15,000 kilograms of milk per day).

The consumption of milk for human food is assumed, on the basis of observations made in sundry places, to amount to half a kilogram a day for every inhabitant. For calves and other young animals only small quantities are required — by calves to be reared for stock cows (about 20 % of total calves born) some 50 to 60 kilograms were formerly consumed, now 80 kilograms, while for calves to be fattened for the butcher (about 15 %) the amount now consumed is 300 kilogr. The remainder of the milk produced is available for dairy purposes. Approximately it may be said that, in 1900, 950 mill. kilograms of milk were consumed as human food, 100 millions were devoted to the rearing of calves, etc., and 1,700 millions were absorbed by the dairies. In 1875 the amount under the last heading was probably no more than about 532 millions.

Dairy Produce. Of the products of dairy-farming, **butter** occupies the foremost place. The manufacture of butter is carried on upon a very large scale, and the butter produced not only supplies the total demand of the country, but leaves a very considerable margin for export. The cheese made, on the other hand, is scarcely sufficient for the home demand. Butter and cheese are made both at specially established dairies, working for the most part for the export trade, and in private homes, at what are termed Household Dairies (Hushållsmejerier), which principally supply the immediate requirements of the home but also produce for sale in the neighbourhood.

Well organized **dairies** have only existed in Sweden during the last fifty or sixty years. Systematic dairy-farming was for a long time confined mainly to the large estates, to what may be called *Manorfarm-Dairies* (Herrgårdsmejerier). Towards the close, however, of the decade 1861/70 *Dairy Companies* (Uppköps- or Bolagsmejerier) began to be established. These companies bought all the milk

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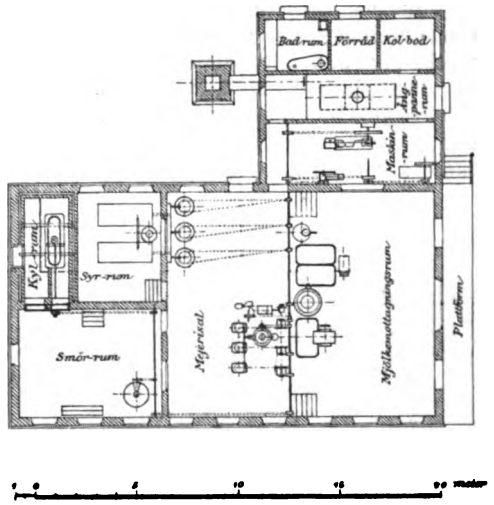

Co-operative dairy. Plan.

they manipulated, and likewise the cream. Numbers of these dairies established branches, where milk was set to cream, the latter being then conveyed to the Central Dairy to be churned. Among the men who were active in the establishment and promotion of dairy enterprises of this character, *H. A. Lidholm*, at Nådhammar, the founder of the first steam dairy and of the first dairy company in Sweden, deserves special mention. Shortly after that example had been set, numbers of farms began to purchase milk to be manipulated in their dairies together with what they themselves produced, and this was the origin of what may be termed the *Manorfarm Milk-Purchase Dairies* (Herrgårdsuppköpsmejerier). Early in the nineties another species of dairy came into existence, viz.: *Co-operative Dairies* (Andelsmejerier). Even earlier than that period such dairies had been started here and there in the provinces of Vestmanland and Norrland, but it was not until about 1890 that the movement had much impetus. These co-operative concerns are owned and worked by a considerable number of small milk-producers, who take back, as a rule, all the by-products and make use of them on their farms. Co-operative dairies have very materially contributed towards enabling those farmers who only produce small quantities of milk, to turn their produce to the best advantage, and they have made it possible to count dairy-farming in Sweden as a manufacturing industry, and rendered it one that bids fair to attain vast dimensions. These dairies are increasing in number year by year, and are compelling some of the other dairies to close. To set a co-operative dairy going, the milk-producers form societies; for the liabilities of these societies the members were until recently jointly and separately responsible, but now the concerns are chiefly founded on the basis of limited responsibility in accordance with the law of June 28, 1895, regarding registered societies.

In about 80 % of the dairies butter alone is produced; in rather more than 10 % cheese alone; while in the remainder (less than 10 %) both commodities are made. Dairies differ very much in size, seeing that the quantity of milk per day varies from some few hundred kilograms to 5 à 30 thousand (and even more in some dairies); the average is 1,200 kilograms. Co-operative dairies have, as a rule, the largest consumption, often reaching a quantity of from 5 to 30 thousand kilograms, while at the Manorfarm-dairies of both the descriptions noted above the total rarely exceeds 3 or 4 thousand a day.

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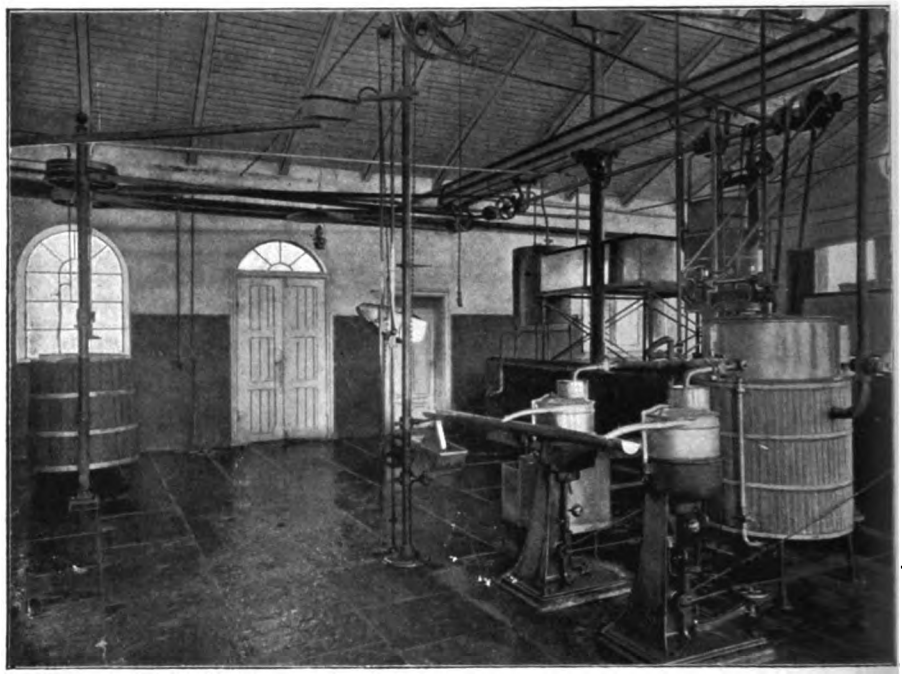
In most places the dairies are very well constructed, with floors of asphalt, cement, limestone, or slating, and are equipped with very good and practical machinery and appurtenances. The motive power is steam, as a rule, though in some places water is employed. The capital sum invested in dairy enterprise is estimated at 15 million kronor. Dairy work has been largely done by women; now, however, in the larger concerns, more especially in co-operative dairies, there are male managers and for the greatest part male hands.



Interior of a co-operative dairy.

In 1900 there were 1,688 dairies in Sweden. The milk and cream they manipulated amounted to about 842·3 million kilograms of fresh milk, or nearly one third of the total supply of milk from the whole country. Of the above quantity 72·7 million kilograms were sold; the remainder, 769·6 million kilograms, being turned into butter and cheese; to the former product may be allotted 725 million kilograms, and to the latter 45 million kilograms, reckoning 11 kilograms of unskimmed milk to one kilogram of fat cheese, and 6 kilograms to one kilogram of half-fat. Out of that milk about 26·11 million kilograms of butter were produced (making 27·8 kilograms of milk to 1 kilogram of butter), and 3·27 million kilograms of fat cheese, about 1·46 million kilograms of half-fat cheese, and 2·52 million kilograms of skim-milk cheese, these products having a total value of about 55 million kronor.

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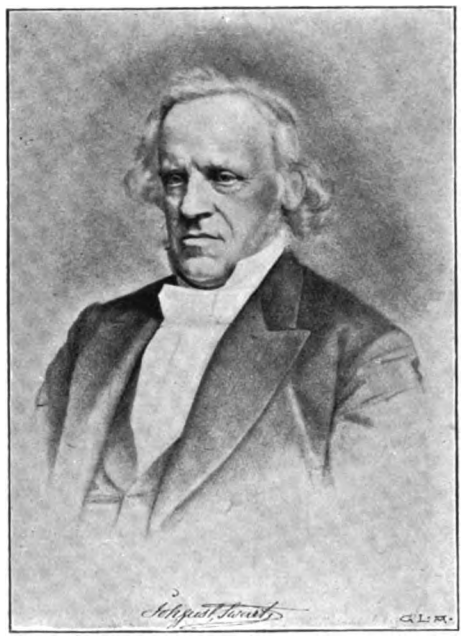
Dairy-work is carried on principally in the provinces south of the river Dalelfven, the districts most extensively engaged being Skåne, Södermanland, the Läns of Skaraborg, Östergötland, Halland, Vestmanland, and the Läns of Örebro and Stockholm. Butter is the chief product. Upwards of $^2/_5$ of the total output of *butter* are made in Skåne; if that produced in the Läns of Halland and Blekinge be added to it, an amount is reached of over $^1/_2$ of the total output for the country.

The manufacture of *cheese* is also carried on to a considerable extent in many of the same districts. For the production of *richer cheeses* the Län of Skaraborg takes the first place, over $^1/_3$ of the total output coming from that province; then come the Läns of Malmöhus, Södermanland, Östergötland, and those of Vesterbotten and Vesternorrland, all of these districts producing over 200,000 kilograms each. The making of *skim-milk cheese* goes on chiefly in Södermanland and in the Län of Skaraborg, each producing about the same quantity, and together over $^1/_3$ of the total quantity; then come the Läns of Östergötland, Örebro, Vestmanland, Malmöhus, and Elfsborg, each with a production varying from 250,000 to 400,000 kilograms.



J. G. Schwartz.

The amount of the production is not, however, an accurate gauge of the vigour with which dairy-work is prosecuted in a given district; a better result is obtained by taking account for the district of the quantity of milk per cow that is delivered to the dairies for purposes of manufacture. The Län of Malmöhus stands first by this reckoning too, with 1,610 kilograms per cow; then comes the Län of Kristianstad with 1,300 kilograms; then the Läns of Södermanland, Halland, Skaraborg, Vestmanland, Stockholm, Östergötland, and Örebro with 500 to 980 kilograms; the Län of Kronoberg and the Norrland Läns (with the exception of the Läns of Gefleborg and Norrbotten) do not reach 100 kilograms per cow.

A) **Butter-making Dairies.** Butter is produced almost exclusively from the cream obtained by skimming milk, the skimming being, in the majority of places, effected by the *use of separators;* in some places, however, *creaming by the ice-method* is still retained.

Not until after 1840 was any systematic skimming of milk instituted in the country. In that year (1840) *R. Tornérhjelm* established, on his estate at Gedsholm in Skåne, a dairy on the so-called Holstein system or pan-method, engaging at the same time dairy-attendants from Holstein to work it. The method, however, never won any large number of adherents, and the same is true of that discovered by *P. U. Gussander* (1793/1871), which was hardly adapted for dairy-work on a large scale at all. In certain respects, however, the last-mentioned method has had an influence on the history of dairying in the country, more especially by its adoption for dairy purposes of vessels and implements made of

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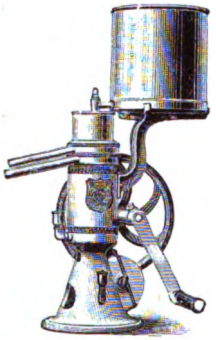
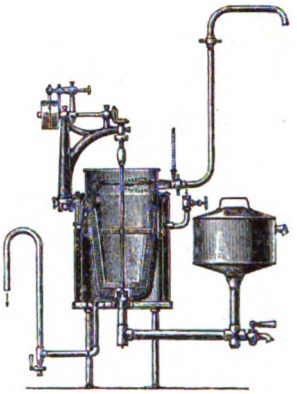
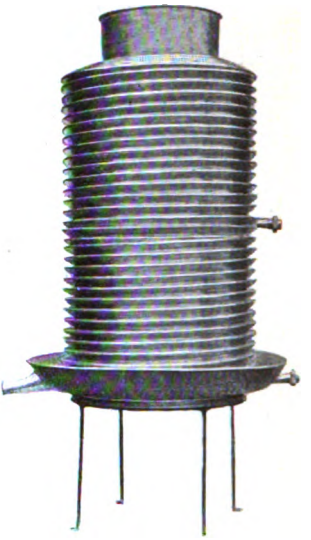


Crown-Separator.

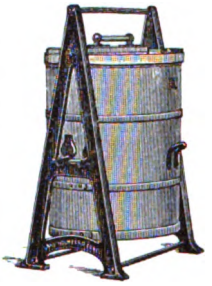


Pasteurization apparatus.

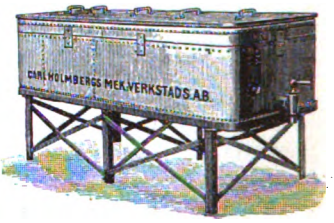


Milk-cooler.

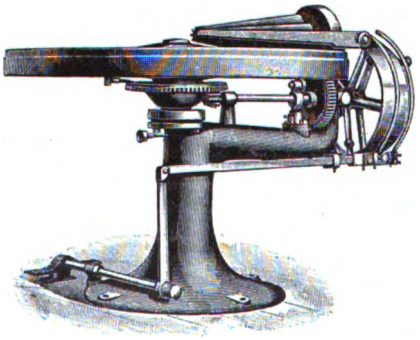
Vessel for Souring-agents.



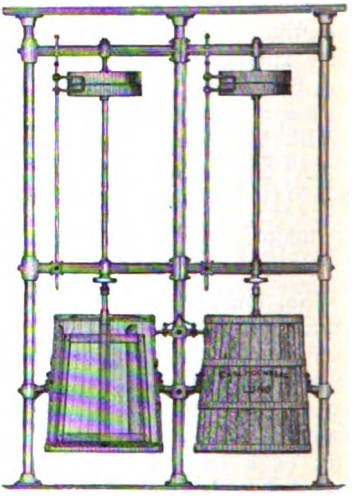
Cream-Cask.



Souring basin.



Butter Kneading machine.



Churns.

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tinned sheet-iron. Not until the year 1864, when *J. G. Swartz* (born in Norrköping 1819, died 1865) produced his **ice-method,** did any system present itself that was suited for dairy-work on a large scale. The ice-method, where the milk is creamed in tall cylindrical or oval vessels placed in ice-water, soon became widely popular, not only in Sweden but also in Denmark, Norway, Finland, Germany, Austria, etc. The method certainly furthered dairy-farming as an industry in Sweden very efficiently, for it was owing to its discovery that dairy companies on a larger scale were rendered feasible. During the seventies the method prevailed almost exclusively but is now retained only at an inconsiderable number of dairies.

Gustaf de Laval.

With the commencement, however, of the eighties the ice-method began to give place to the **separating-system,** by which the cream is in one process removed from the milk by means of separating and centrifugal machines. By reason of the numerous advantages of this system it quickly spread throughout the country. The skimming-machine used in Sweden to the exclusion of almost all others is the one invented by *G. de Laval* (born in Orsa, North Sweden, in 1845) which was named **Separator** and first appeared in 1878. From time to time improvements and alterations have been made in the construction of this machine; thus, thanks to the discovery of the Alpha-system in 1891 by a German engineer, *von Bechtolsheim*, and the recent invention of *Berrigan*, an American, for facilitating the flow of milk into the machine, the *Alpha-Separators*, or Alpha-Laval Separators as they are named abroad, have attained an efficiency in turning-out power unsurpassed by any rival. At present there are no less than 15 different types and sizes of separators; they can be worked by a steam-engine, a steam-turbine, or by hand, and can skim from 40 to 2,000 kilogr. per hour. In addition to de Laval's separators many other systems have partially come into vogue. Of machine-power separators, however, only two, the *Crown* and the *Baltic*, have of later times commenced to be manufactured. — At first the motive power used for separators was either a horse or machinery; but since the introduction of the Alpha-system, hand-separators, too, have been adopted in considerable numbers in small and household dairies. Besides the above-mentioned hand-separators, several others have come into use in the country, such as the *Helice*, *Star*, *Vega*, *Globe*, *Phoenix*, *Crown*, *Svea*, the *A. B. C.* Separators, and others. — To

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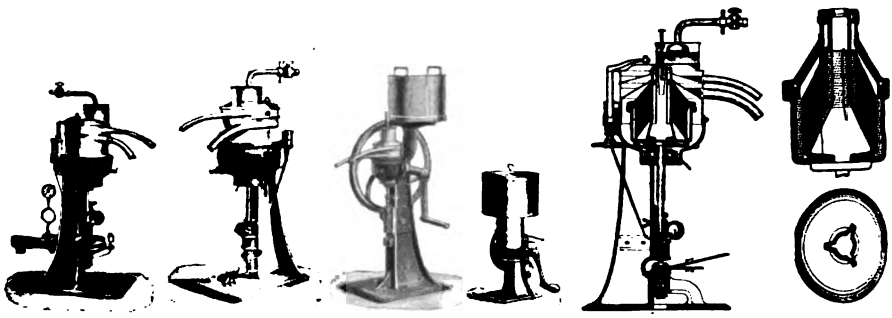
show the enormous development separators have had during the last two decades, it will suffice to say that some of the smallest hand-separators of the present day can skim as much in an hour as the machine-separators when they first came out; the work is, moreover, done with much greater cleanliness and with an expenditure of power amounting only to about 3 or 4 % of that of the first separators.

Milk is separated in more than 90 % of the butter-making dairies and also in a considerable number of the small and household dairies; it is calculated that there are over 2,000 machine and more than 50,000 hand-separators in use in Sweden, by far the largest number being of the Alpha-system.

Alpha-Laval separators.



Pony, for turbine. *A I*, for steam-power. *B.* for hand-power. *Colibri*, for hand-power. *Section of A I and A II.* Model of 1896. Model of 1899.

In a large number of dairies, the new milk, or else the cream and the skimmed milk separately, is subjected to pasteurization, after which it is cooled in coolers. The cream is principally used for the manufacture of sour-cream butter, the so-called export butter. In the seventies sweet-cream butter was produced at a number of dairies and was quoted then at higher prices than the export variety; the principal market for it was Copenhagen, where the packers disposed of it. At the present day, sweet-cream butter is only exceptionally made, not being offered as a special article but sold along with the sour-cream export butter. In the manufacture of this latter butter, the cream is subjected to a special souring-process, that has been very materially improved of late years by the employment, on the one hand, of vessels of tinned sheet-metal, well adapted for their purpose, and on the other, of carefully prepared souring-agents, in the production of which pure-cultures (normalsyreväckare) are used in many dairies; these are developed in vessels specially constructed for the purpose.

In most dairies the cream after becoming ripe is churned in the so-called Holstein churns; in a few of the larger dairies, however, churns of new types have been introduced to enable larger quantities of cream to be treated at a time. The butter is nowadays worked almost exclusively by mechanical butter-workers, first used in Sweden in 1872. After the first working the butter is salted and worked afresh, after having lain in a sufficiently cool place long enough for the salt to melt.

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TABLE 80. *Exports of Butter, by destination.* Quintals à 1·97 cwts.

Averages for the years	Total exports, by quintals, to				Percentage.			
	England.	Denmark.	Other countries.	Total.	England.	Den-mark.	Other countries.	Total.
1871/75.....	11,219	17,481	2,846	**31,546**	35·57	55·41	9·02	**100**
1876/80.....	20,427	19,819	1,706	**41,952**	48·69	47·24	4·07	**100**
1881/85.....	45,957	33,202	1,044	**80,203**	57·30	41·40	1·30	**100**
1886/90.....	94,015	43,497	3,443	**140,955**	66·70	30·86	2·44	**100**
1891/95.....	132,774	65,133	2,341	**200,248**	66·30	32·53	1·17	**100**
1896/00.....	137,658	83,811	1,134	**222,603**	61·84	37·65	0·51	**100**
In 1896.....	163,371	81,567	2,875	**247,813**	65·93	32·91	1·16	**100**
» 1897.....	148,715	85,907	1,999	**236,621**	62·85	36·31	0·84	**100**
» 1898.....	144,285	85,734	552	**230,571**	62·58	37·18	0·24	**100**
» 1899.....	126,182	80,101	100	**206,383**	61·14	38·81	0·05	**100**
» 1900.....	105,737	85,747	144	**191,628**	55·18	44·75	0·07	**100**

Unsalted or fresh butter is only prepared in very small quantities for local requirements. When salted and worked, the butter is packed in kegs of 51 or 52 kilogr. net weight. In a few dairies the butter is occasionally made up into rolls, which are then wrapped in parchment paper and packed in boxes holding a weight of 56 English pounds or 25·4 kilogr. By reason of more work and cost being thereby involved, butter packed in that way commands a somewhat higher price as a rule.

In a number of dairies refrigerator chambers have been built for the storage of the butter between the workings and after packing. The cooling of these chambers is effected by means of ice, though in some places mechanical refrigerators have been introduced for cooling not only the butter but also the water used in the dairy.

Latterly much attention has been devoted to the construction of machines to *skim and churn at the same time.* The first machine of this description, the Extractor, was constructed by *C. A. Johansson* in Stockholm (patented in 1887). Dr. *de Laval* soon after brought out another apparatus for the same purpose, the so-called Continuation Churn, to be applied to the separator, to churn the cream as it issues from it. Somewhat later (in 1891) another machine of a similar character came out: the Accumulator, invented by *A. Wåhlin.* The last to appear was the **Radiator**, in 1893, constructed by *E. G. N. Salenius.* Of these machines it is only the last-mentioned, being in many respects superior to its predecessors, that has been taken up at all generally.

B) **Cheese-Factories.** Thanks to the measures taken by the Board of Agriculture in organizing Cheese Exhibitions, Dairy Meetings etc., more uniformity has begun to make its appearance in this branch, and now an effort is made to manufacture the following kinds in the same quality as far as possible:

a) Of whole-milk and half-milk cheeses: large-hole cheeses, the so-called Swedish manor-farm cheese; *small-hole cheeses:* Vestgöta cheese, Norrland fat cheese, spiced and unspiced, and Gouda cheese; and *close cheeses:* Cheddar. — *b)* Of *skim-milk cheeses:* ordinary skim-milk cheese, Dutch spiced cheese, and Cheddar spiced cheese.

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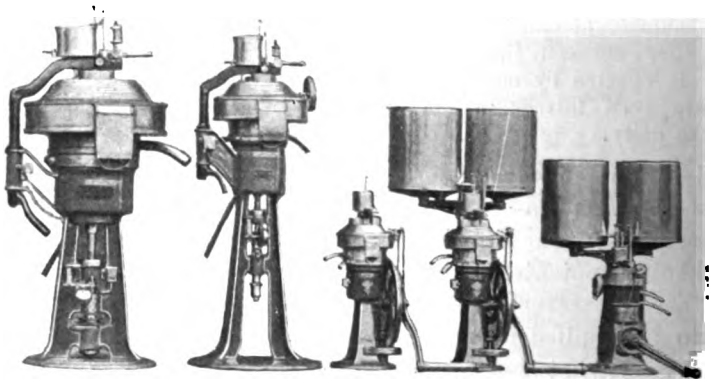
Besides these, there are varieties of cheese produced, though in very small quantities, in *imitation* of foreign makes: Gorgonzola, Stockkumla (imitation Stilton), and certain kinds of the savoury cheeses. Finally, it may be worth while mentioning that in earlier times a cheese was produced named Småland Parsons' cheese (Prästost), that was thought very highly of but has almost gone out of favour now.

Among the chief varieties of cheese that are made in Sweden, the Vestgöta cheese is presumably the oldest and may actually be, though of different shape, a linear descendant of a cheese which the geographer Olaus Magni (1490/1558) praises very highly. Swedish Manor-farm cheese is a variety of Swiss cheese, said to have been first made at Ruuthsbo in Skåne in the thirties. A native Swiss was called in to introduce it, and the success of the venture soon carried it further afield to certain manor farms in Vestergötland and Östergötland, in which provinces this kind of cheese is now principally made. After 1860, *A. Nathorst* introduced the manufacture of Cheddar cheese on some farms in Vermland, Skåne, and Vestergötland. Dutch cummin-cheese began to be manufactured by *O. Hedengren* at Riseberga in the province of Nerike in the year 1846. This sort of cheese was then taken up in Södermanland, and the Agricultural Society of that province despatched their dairy-instructress to Holland in the sixties, to make a study of the manufacture of it on the spot; the result was that several farms in that province took up the variety with very great success. It is, moreover, in that part of the country that the production of cummin-cheese principally thrives. The making of Gouda cheese is a thing of the last few years only.



Radiators.

The **Disposal of the By-products.** The by-products in the manufacture of cheese and butter, viz.: skimmed milk, buttermilk, and whey, are made use of in many different ways.

It proves easiest for the co-operative dairies to get rid of the by-products, for in their case the residue is taken back by those who supply the milk, for use on their own farms according to circumstances. This forms one of the superiorities of these concerns over other dairies and has doubtless been largely instrumental in promoting their success in the dairy industry. At other dairies the by-products have as a rule to be consumed on the spot.

Skimmed milk can be employed as human food, in the manufacture of cheese, in the rearing of calves, and also in the fattening of pigs etc., in addition to which there are not inappreciable quantities absorbed by margarine and margarine-cheese factories. Buttermilk and whey are chiefly used for fattening pigs. From

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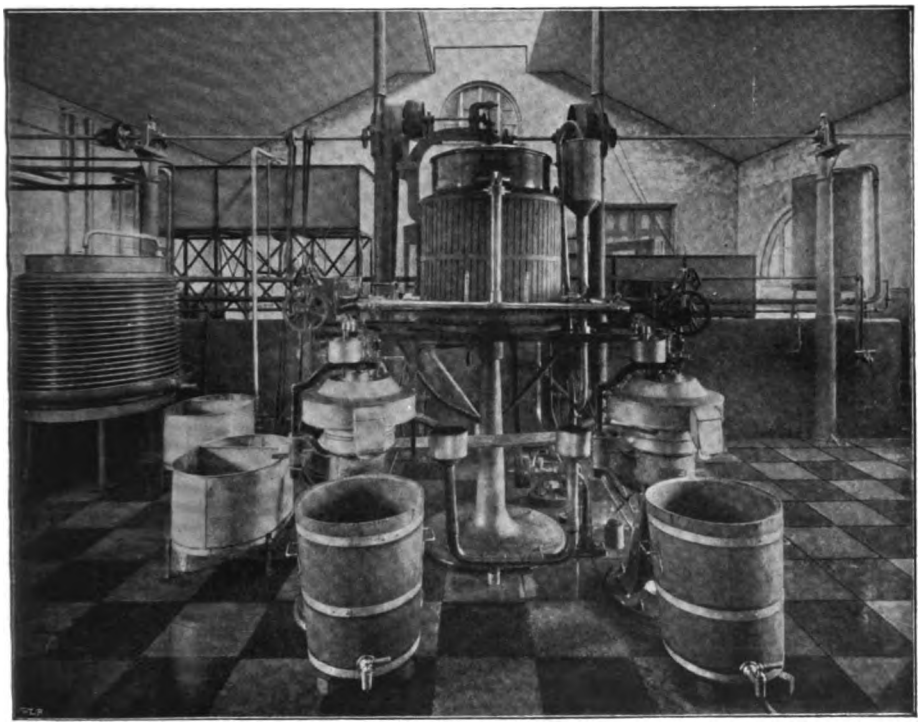
whey, however, they also manufacture *whey-cheese* (mesost) and so-called whey-butter; in this process, the fatty matter is nowadays usually removed by separation, the yield being thereby increased and the quality of the butter improved.

Attempts have also been made to use up the by-products in other ways. Thus, *W. Rehnström* has laboured with great assiduity to produce certain preparations, such as serine and lactoserine, by an evaporation of whey or mixtures of whey and skimmed milk; these preparations are calculated to be employed advantageously in the preparation of aliments for human beings and strong food-stuffs for animals, especially horse-bread, etc. *A. Lindström* of Trystorp has tried to obtain a strong food for milch cows from skimmed milk, by subjecting it, in conjunction with certain fodder-stuffs, to fermentation; finally, an attempt has been made, by infusing certain fatty substances into skimmed milk by aid of the Emulsor, invented by Dr. de Laval, to render skimmed milk more serviceable for the rearing and fattening of calves. The expectations entertained — thereby to obtain more scope for the profitable disposal of the skimmed milk — have not, however, as yet been realized.



Radiator dairy.

The by-products are principally employed in the *fattening of pigs*, which may, nowadays, be looked upon as an auxiliary of dairy-farming. This branch, however, might undoubtedly be still more developed than hitherto, for it now does not even satisfy the demand for bacon in Sweden alone. There appears, however, some prospect of improvement in this regard, since the Agricultural Societies up and down the country have commenced to pay more attention to the breeding of pigs.

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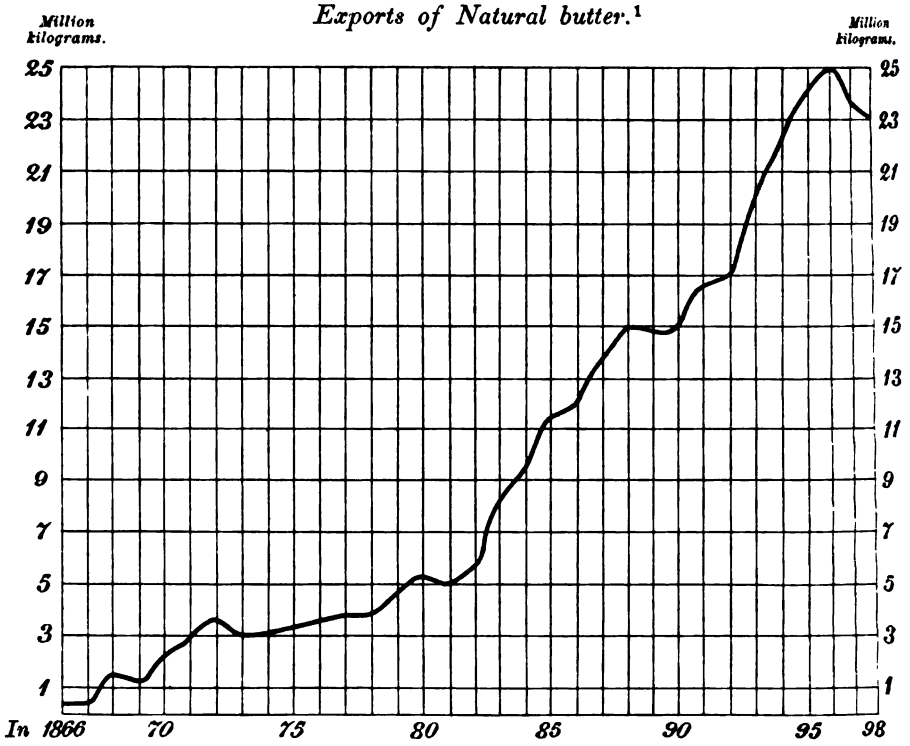

Measurement of and Payment for Milk. In most of the large dairies at the present day, milk is weighed, the quantity being registered by the kilogram; on the other hand, when sold as human food, milk is measured by the liter in almost all cases. The payment made for milk is almost always dependent on the price of butter, though the system of payment according to the percentage of fatty matter in the milk has been adopted in several dairies.

This system, however, could not be used until instruments for determining, on a large scale, the amount of fat in the milk had been brought to perfection. These were forthcoming in the *lactocrite*, invented by G. de Laval and first used in 1886, and in the *butyrometer*, of which *Ivar Lindström* was the originator, and which was put on the market by the Separator Company in 1891. The last-mentioned apparatus is the one most used at present. To facilitate the calculation of prices as they vary, the *Swedish Dairy Experts' Association* has had Tables published month by month since 1895, based on the percentages of fat and on the butter prices. To further this juster method of payment, certain of the Agricultural Societies have sought to afford dairies opportunities for having their milk tested by the institution of *Offices for Milk analysis* (cf. page 604). Moreover, in several of the chemical institutions milk-testing is very largely undertaken.

[1] In 1899 the exports were but 20·6 million, and in 1900, 1901, and 1902 resp. 19·2, 18·8, and 20·0 million kilograms.

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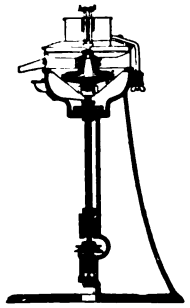
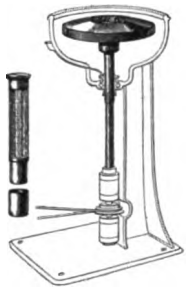
TABLE 81. *Exports of Butter at various Swedish ports.* By kilograms à 2·2 lbs.

Ports of export.	In 1880.	In 1885.	In 1890.	In 1895.	In 1900.
Gothenburg	2,154,835	5,042,861	7,359,852	13,216,176	9,353,833
Malmö	2,122,620	4,349,474	4,115,513	6,800,143	6,690,924
Helsingborg	343,443	482,185	2,944,707	3,296,246	1,960,512
Landskrona	260,100	880,718	178,787	715,587	1,148,980
Other ports	379,780	690,951	444,477	32,995	8,534
Total	**5,260,778**	**11,446,189**	**15,043,336**	**24,061,147**	**19,162,783**

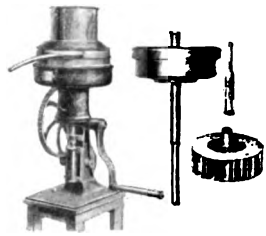
Trade in Dairy Produce. Even in the early sixties the **Butter export** had only reached about 25,000 kilograms annually, the import being as much as a million kilograms, or more (cf. Table 79, p. 571). Not until 1864 did the figures for the exports of butter commence to rise materially. Since then, the figures were long steadily growing. In 1896 the exports reached a maximum (25 million kilograms) which since then has not been attained.



The de Laval Emulsor.



The de Laval Lactocrite.



The Lindström Butyrometer.

At present the greatest part of the butter manufactured in the dairies is exported. The dairies despatch their produce, as a rule, once a week to the centers of export (many railways providing special refrigerator cars during the summer), from where, again, it is disposed of to foreign markets. Only exceptionally do the dairies sell direct to foreign buyers. The largest proportion of the butter exported goes to England, more than a third of the total amount, however, finds its way thither through the hands of Danish merchants. The chief centers of export are Gothenburg, Malmö, Helsingborg, and Landskrona.

Payments for the butter received and delivered are made every week, the prices being still ruled mainly by the quotations of the Copenhagen market. Since February 1, 1897, there exists a Swedish quotation; it is fixed, however, a week subsequent to the Danish and notes the average prices obtained in the Swedish centers of export for best quality butter, being therefore, in reality, a market-report. The prices obtained for the different dairy articles have varied very much, but a continual tendency to decline is making itself felt, especially in the case of butter.

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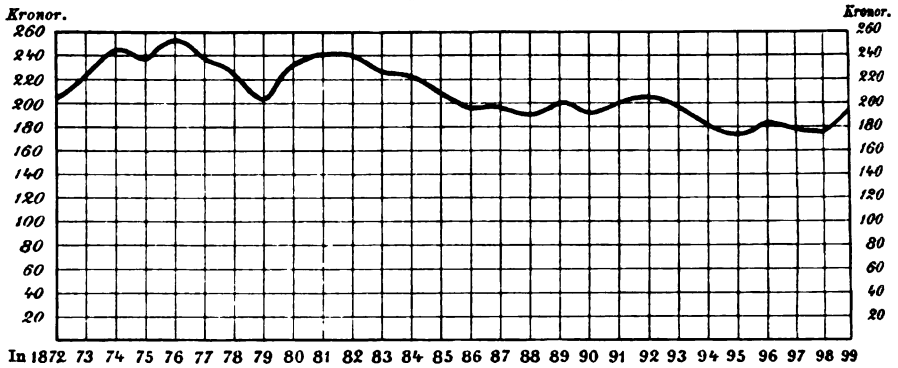
Prices of best export Butter, per quintal.[1]



Cheese is not an article of either import or export to any large extent (cf. Table 79, p. 571). The imports, as a rule, exceed the exports and the source is mainly Germany.

The value of the exports of dairy produce amounts yearly to from 40 to 50 million kronor; that of the imports to scarcely one million kronor.

The consumption in the country itself may be estimated, for 1900, to 7·2 kilogr. of *butter* (besides about 2·1 kilogr. of margarine), and 2·1 kilogr. of *cheese*, — whole and half-milk. (The figure 5·54 kilogr. per inhabitant of butter, given p. 156, refers to the middle of the eighties).

Measures for the Furtherance of Dairy-Farming.

During the last few decades, both the State and the Agricultural Societies have endeavoured in many ways to foster and support the dairy-farming industry. The *Government* has appointed an instructor and a learner in Dairy-Economy and maintained an agent in England (since 1886), to superintend and assist the export of dairy produce from Sweden; furthermore, the State provides instruction in this branch in both higher and lower agricultural schools, and grants pecuniary aid to butter-testing and cheese exhibitions. On an average, the total annual expenditure of the State for these purposes is about 50,000 kronor.

The Agricultural Societies are instrumental in various ways in promoting the interests of dairy-farming; they appoint itinerant teachers on the subject, they give grants to schools and support to exhibitions, they advance money for the erecting of dairies, etc. One Län, that of Östergötland, maintains, too, a bacteriological institution, which among other things provides pure cultures of souring agents.

[1] The figures for the years 1900, 1901, and 1902 were resp. 192, 194, and 190 kronor. One hundred kronor per quintal = 2·8 £ per cwt.

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The itinerant teachers were originally (from 1862 onwards) women (dairy-instructresses), in the employ of the several Agricultural Societies. Since about the close of the seventies, however, male instructors, styled Dairy Experts, have more generally occupied these positions, and in many provinces they have superseded the dairy-instructresses altogether. At present, there are Dairy Experts attached to all the Agricultural Societies, except one. Some of the societies engage dairy-instructresses too, these being principally employed for some length of time at one place, in teaching some detail of dairying, very often that of cheese-making. — The total amount expended by Agricultural Societies in measures for the furtherance of the dairying industry in 1901 was about 100,000 kronor (à 1·10 shilling or 0·268 dollar).

Dairy Exhibitions and Associations. An important agency in the development of dairy-farming as an industry have been the exhibitions of dairy produce.

From 1853 to 1891, these exhibitions were held in connection with the General Swedish agricultural shows, but now the dairy exhibitions are quite apart from them. As dairy-farming became extended, the need for more frequent and larger exhibitions was felt, and since the close of the sixties, such exhibitions have become fairly regular; sometimes, several of them have been held in one year; thus at Malmö, for the province of Skåne and its neighbours, down to the year 1890, and at Gothenburg, for Western and Central Sweden, down to the year 1893. Recently, these exhibitions have resolved themselves into butter-testing meetings at the centers of export, the customary export article being there subjected to various tests of its quality, etc.

These butter-testings commenced at Malmö in 1891, and the example was followed at Gothenburg in 1893. Since 1894, these functions have been officially termed the *Swedish Butter-testings* and are under a uniform control, being supported by Government to the extent of 10,000 (raised in 1899 to 15,000) kronor annually. Since 1896, a Board has been charged with the management of all of them, deputies on it being appointed by the Agricultural Societies taking part, and they are subject to the inspection of the Royal Board of Agriculture.

These Butter-testings have increasingly been supported by makers, as many as 393 dairies taking part in them in 1900; 1,680 kegs of butter from these dairies were tested as to quality, quantity of water contained, and as to the presence of special ingredients for preserving the butter, without any of the latter being discovered in a single one. The dairies that submit their produce to these tests are the more important ones, as a rule; consequently about 75 % of the whole export of butter is thus under control.

General *Cheese-Exhibitions* in conjunction with conferences of dairymen were organized in Stockholm in 1894, 1895, and 1899 by the Royal Board of Agriculture; it is intended that they shall from time to time be repeated.

Besides the above-mentioned exhibitions, the scope of which has been considerable, smaller shows have been held in many places, being a regular feature on the programmes of some of the Agricultural Societies; these, too, in their measure, contribute effectively to stimulate the industry.

Dairy and Dairyfarmers' Associations are also important factors in the prospects of future advance; there exists a variety of them. Their object is partly to

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set on foot discussions on questions relating to dairying, and partly to procure the advantages for their members accruing from community of purchase and sale; they also give information as to the prices being given, measures necessary for the transport of dairy produce, etc. These associations began to spring up in the seventies, but they did not meet with much support until the last decade. All the dairy experts and the teachers of dairy-work have also combined, to watch their own interests and to assist in the development of the dairying industry. Their union, called the *Swedish Dairy Experts' Association*, was founded in 1888 and has been the prime mover in not a few important reforms.

Machines and Implements for Dairy-work.

Almost all the highly varied machines and implements employed in modern dairy-work are manufactured in Sweden at different factories and workshops, which in many cases exist solely for the purpose. This branch of manufacture has become a very important phase of the industry of the country latterly; it employs several thousand operatives, and through the exportation of very considerable quantities of manufactured articles the national wealth is annually increased by several millions of kronor. Foremost among these manufacturing concerns stands the *Aktiebolaget Separator*,[1] one of the largest industrial undertakings in the country. In their splendid workshops in Stockholm they turn out principally Alpha-separators, but also pasteurizing and refrigerating apparatus, milk-pumps, butyrometers, emulsors, etc. At present there are about 1,200 hands and 50 engineers and clerks being employed; upwards of 68,000 separators are sold annually, the market being the whole world; the total output already considerably exceeds 400,000. The Company also possesses branch-establishments in Denmark, Germany, Austria, Hungary, and America. — Separators of different kinds are also made in other factories: thus the *Morgårdshammars mekaniska verkstad* (mechanical works), at Smedjebacken in Dalarne, turn out the Helice-Separators; the *Svenska Centrifugaktiebolaget*,[1] the Crown-Separators; *B. A. Hjorth & Co.*, the Vega; *Aktiebolaget Rotator*, the Orion and Globe; *Aktiebolaget Radiator*, the Star; *Aktiebolaget Sveaseparatorn*, the Svea; and *Salenius' verkstäder* (works), the Phoenix.[1] Radiators are made by the *Aktiebolaget Radiator*.[1]

Vessels and implements of tinned steel-plate for use in dairies are made by the *Kockums järnverksaktiebolag* (järnverk = iron works), the *Wedholms mejerikärlsfabrik* (dairy-vessel factory), the *Karlskrona galvaniseringsaktiebolag*, the *Olofström* and the *Eskilstuna stålpressningsaktiebolag* (steel-pressing Co.), and others; whey-cheese boilers and brass and copper dairy-vessels, by the *Skultuna bruk* (works). — Certain of the manufacturing-shops turn out different kinds of machines and implements on a larger or smaller scale and also boilers and steam-engines

[1] Aktiebolag = joint-stock company.

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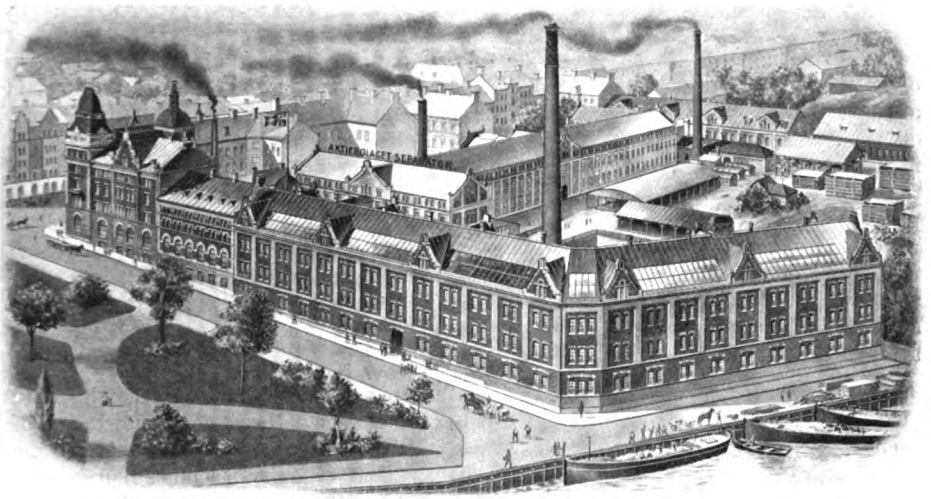

Factories of the Aktiebolaget Separator, Stockholm.

for use in dairies. Of these may be mentioned *C. Holmbergs mekaniska verkstads aktiebolag* in Lund, a firm that for a long time past has made a speciality of the manufacture of all kinds of dairy-machines and implements, and has put up and furnished not a few dairies both in Sweden and the neighbouring countries.

Of the same character are the *Halmstads mekaniska verkstads-aktiebolag* (mechanical works) and the *Ystads mekaniska verkstads-aktiebolag*, *Söderbloms gjuteriaktiebolag* (gjuteri = foundry) at Eskilstuna, and *Rudelius and Boklund* at Lund, and others. Dairy machines are sold by *Sten Ericsson* at Stockholm, and *A. Hollingworth and Co.* at Örebro; these firms supply all the dairy machines and implements in the market and, in part at least, manufacture them. These and the workshops above named are prepared to furnish designs and estimates for dairies, undertaking also the complete equipment of them. — Implements, more especially for small dairies, are made by different works. The value of articles (machines and implements) for use in dairies manufactured in our country in 1901 is estimated at 8,886,000 kronor, and the exports during the same year at 7,711,000 kronor.

Dairy-preparations, such as dyes for butter and cheese, different kinds of rennet, cultures, etc., are also made in Sweden by, for instance, *S. Barnekows teknisk-kemiska laboratorium* at Malmö; these preparations are, however, imported in large quantities, chiefly from Denmark, as is the case also with the butter-salt.

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Dairy-Schools.

A) **State Dairy-Schools.** The *Dairy-Institute at Alnarp* embraces two divisions: the *Higher Dairy-School* and the common *Dairy-School.* There is a maximum of 12 pupils every year, two being on the foundation, one in each division. The course covers one year. The higher school has to train teachers in dairy management. The conditions for entrance are: to have gone through the two years' course at an agricultural high school and to have had one year's practical experience in dairy-work. The fees are 600 kronor inclusive (a krona = 1·10 shilling or 0·268 dollar). — The common dairy-school trains men to become managers of large dairies. The conditions for entrance are: to be 19 years of age at least, to possess good certificates from the common school, and to have had at least one year's practical experience of dairy-work in all its branches. The fees are 400 kronor inclusive.

The *Dairy-School at Åtvidaberg* exists to afford men and women who have already had experience in dairying and acquired some theoretical knowledge of their business, an opportunity to study further the theory of dairy-economy, the manufacture of butter and cheese, the management of dairy-machines and apparatus, and to learn how to keep memoranda upon dairy-management. There are two courses given every year, one from Nov. 1 to May 1, and the other from May 1 to Nov. 1. At each course there is a maximum of 4 pupils; pupils can attend a succession of courses if they so wish. Conditions of entrance: candidates must have had practical experience in the management of a dairy and possess sufficient general knowledge and theoretical understanding of dairy-economy to ensure their being able to make profitable use of the instruction given. The fees are 180 kronor inclusive. Additional pupils in cheese-making are admitted for short periods at specially fixed rates.

The *State Dairy-Stations* give practical and theoretical instruction to female pupils, their courses extending over 2 years. The pupils at these institutions receive board, lodging, and teaching free of charge and 50 kronor a year besides. The institutions are located at important dairies in different parts of the country and are 26 in number, 18 of them for the first year's course, which is wholly practical, and 8 for the second year, in which both practical and theoretical instruction are imparted. There are in all 66 pupils at these Stations.

At the State schools above mentioned, a total of 90 pupils can be received every year, and during the years 1859/1902, no less than about 2,350 pupils have been through them; 120 out of the number having gone on to the advanced course. — The State grant to these schools is at present 27,000 kronor annually.

B) The **Agricultural Societies' Dairy-Schools.** Several of the Agricultural Societies support teaching institutions for female pupils, where these receive board, lodging, and instruction free of charge, in some cases, too, a small salary. The courses are either for one year or two; they are mainly of a practical character, though theoretical study occupies the later portion, embracing from 2 to 15 weeks, according to circumstances. At these schools a total of 36 pupils are being taught every year, and the cost for the societies amounts to about 15,000 kronor.

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4. PUBLIC AND PRIVATE INSTITUTIONS TO THE ADVANCEMENT OF AGRICULTURE.

In the administration of Sweden, matters referring to farming and cattle-rearing have up till 1900 belonged to the Department of Home Affaires. That year, however, a special **Department of Agriculture** was instituted, to which have been removed the matters above mentioned as well as those of forestry and certain other congenial ones. This new department is divided in two bureaus, one of which attends to agricultural matters, the other to forestry.

A peculiar position was for a long time occupied by the **Academy of Agriculture** as being an institution both scientific and administrative — the latter, moreover, in spite of always having elected its members itself. Of the organization and present functions of this academy account is given above (p. 376). The administrative business has now been made over to the **Board of Agriculture,** established in 1890. This Board consists of a head bearing the title of Chief director, and four members, viz. the inspector of agriculture, a chief engineer, an inspector of the fisheries, and a secretary; besides, a veterinary surgeon is attached to the Board to guide the examinations concerning tuberculosis among the cattle-stock of the country. The Board of Agriculture annually publishes a series of informations on subjects of agricultural importance, to which is joined a report on the work of the Board itself and the institutions subordinating.

The immediate direction of the horse-breeding of the country, the State studs, and the distribution of horse-premiums is managed by the **Stud General Board,** consisting of the Director and a Secretary. To treat questions of high importance the *Stud Commission* is called in, made up of the director at the General Board and two members appointed by the King. — In 1902, the Board had at its disposal a State subvention of 100,000 kronor for horse-premiums, and 59,620 kronor for the promotion of horse-breeding. Inclusive of income from leases and other sources, the total yearly State expenditures for such purposes are about 336,000 kronor.

Among public institutions for the improvement of agriculture may also be mentioned the work of the **agricultural engineers,** dating from 1835. In 1857, these functionaries had their present title given to them; their instruction in force is of December 13, 1889. At the present moment, there are 21 agricultural engineers working within the same number of districts and having for assistants stipendiaries appointed by the Board of Agriculture.

The agricultural engineers draw up plans for cultivation, drainage, lake-sinking, meadow irrigation, reclamation etc. and superintend the carrying out of these kinds of work. In 1901, the area of land examined by the agricultural engineers for the purpose of improvement,

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occupied 47,710 hectares — the chief part being watery grounds intended for cultivation.

Not only by administrative measures, but also by the foundation and subvention of institutions for instruction in agriculture, and by patronizing scientific researches for agricultural purposes, the State has contributed towards raising the agricultural trade. Besides, it has established a Mortgage Bank to supply the needs of agriculture; it grants loans for cultivatory undertakings and gives contributions to a great number of private institutions, above all to the Agricultural Societies.

The whole **budget estimates** for 1903 of the newly established *Department of Agriculture* amounts to 6,793,800 kronor, of which 4,859,600 kronor are put on the regular and 1,934,200 kronor on the extraordinary one. Of these, 63,200 kronor are allowed for the department itself; out of the remaining items, about 1,800,000 kronor may be considered as directly intended for the benefit of agriculture. These items are on the *Regular estimate* as follows: The Board of Agriculture 31,800 kronor, agricultural instructional establishments 270,600 kronor, the agricultural engineers and their assistants 49,500 kronor, veterinary establishments 59,700 kronor, the improvement of horse-breeding 159,620 kronor, prevention and checking of infectious diseases among domestic animals 30,000 kronor, general promotion of farming and husbandry 175,000 kronor, the land-surveying staff 89,200 kronor, »re-parceling» and subventions for »removal» 113,000 kronor (see p. 512), besides a number of minor items. On the *Extraordinary budget* for the same year are allowed: for instructional establishments 124,300 kronor, for prevention and checking of tuberculous diseases in cattle 50,000 kronor, to promote bog-draining and drawing-off of water 500,000 kronor, etc. To this may be added the grant of 38,250 kronor (on the extraordinary budget) for chemical stations and perhaps also part of those means, at least, that are intended for the general surveys of the Kingdom and for geological researches. On the budget of the Ecclesiastical department the subvention for veterinary instruction (59,400 kronor) is entered. (A krona = 1·10 shilling or 0·268 dollar.)

Agricultural Science.

It seems desirable here to insert a brief notice of the very important ally practical farming has in agricultural science. The first traces in Sweden of theory as being employed in the service of agriculturists is to be found in such books of notes as *Per Brahe's* Household-Book (of 1581) and *Rålamb's* A Nobleman's Exercises (of 1690); it was not, however, until about 1750 that real efforts in that direction were made, and then in conjunction with the newly awakened interest in rural economy and natural science. While *Jakob Faggot* (1699/1777), Chief Director of the land-surveying Department and Secretary of the Academy of Sciences, was the originator of the epoch-making »re-parceling of lands» (Storskifte and Enskifte, see p. 512), and while *Jonas Alströmer* (1685/1761) and his sons were awakening the attention of farmers to the department of stock-breeding, both by papers and lectures, two Finns, by name *A. Gadd* (1727/97) and *P. J. Bladh* (1746/1816) were at work to the same end, and *Joh. Fischerström* (1735/96), a member of the Academy of Sciences, was publishing his New Swedish Dictionary of Agricultural Economy and his Observations concerning Swedish Farm-Management, Public and Private. Meanwhile, Chairs in Agricultural Economy had been founded at the Universities of Uppsala and Lund in the years 1740, 1750, and 1759, without any very tangible result being forthcoming, though.

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About the same period, however, scientific men began to turn their attention to the condition of the main industry of the nation. *K. von Linné* (Linnæus; 1707/78), whose writings contain numerous observations touching upon agriculture, took up for special treatment »Those native Plants which in the absence of Cereals might be employed in the preparation of Bread and Food», and a pupil of his, *Anders Jah. Retzius* (1742/1821), continued his master's labours by a work entitled, Attempt to draw up a Flora Œconomica, and, furthermore, contributed to the knowledge of the history of domestic animals by an essay entitled, Studies upon Horned Cattle, based upon discoveries in the Skåne Peat-mosses. Later, *J. J. Berzelius* (1779/1848), in his lectures on Animal Chemistry in the years 1806/08, established this branch of the subject on its present basis. The half-century from 1720 to 1770, termed politically the »Era of Liberty», has a pretty extensive literature to show in the domain of agricultural science, and the efforts put forth in its interest are in some cases distinctly remarkable. *J. G. Wallerius* (1709/85), Professor of Chemistry, occupies an important place among his contemporaries; his work: The Chemical Foundations of Agriculture, establishes him as a pioneer in Agricultural Chemistry, and proves him at the same time to have been far ahead of his age. Another treatise of his gives us a very complete Theory of Earths; he knew, moreover, how to apply his knowledge practically as a farmer, some account of which he has left us in his Thirty Years' Observations on Farming. — In the Economic Annals, published by the Academy of Sciences, there frequently appeared scientific papers on the various branches of rural economics, and moreover, several pamphlets treating the subject from a practical point of view were printed during the above-mentioned period.

Rationally studied theory in agriculture, however, cannot be said to have really laid its definite impress upon the practical work of farming the country, until, during the fourth decade of the last century (1831/40), the new movements in agricultural respects in England and Germany, and the ever extending literature that those new movements brought in their train, began to make themselves felt in Sweden too. *Edv. Nonnen* (1804/62), a pupil of Thaer, may be said to have been the first to have made a more scientific study of farming feasible by founding, in 1833, the first agricultural college, that of Degeberg, as also by means of his lectures and pamphlets; in many departments he proved himself possessed of rare qualities as a pioneer. *Alexis Noring* (1799/1844) made known in Sweden the new principles adopted in England at that period in the breeding of stock, and was the editor of a number of serial publications, amongst which more especially worthy of mention are: The Quarterly Review of Agriculture and Stock-keeping (1836/41), which, together with Handbooks on the same branches, bears eloquent witness to the very extensive and fruitful industry he devoted to these subjects. *Josef Fogg*, an Englishman, was busy at the same period in preparing his very widely read Handbook on Cattle-breeding (1836/41). — Finally, *John Teofil Nathorst* (1794/1862), also a pupil of Thaer, came to the front as early as 1825 by winning a prize with his Handbook on the Knowledge of Wool and the Rearing of Sheep, and again, in 1832, with another prize work entitled: Suggestions upon Teaching-Establishments for Agriculture; later on, he was exceedingly active in his capacity of Secretary at the Academy of Agriculture, not only as a writer but also as an organizer and a teacher.

While thus the theory of farming had already been established on approximately the same basis upon which it must still be said to rest, the more technical details of the science in actual practice were very far from being thoroughly understood, owing primarily to an ignorance of the natural laws underlying them. The honour of having been the first to remove to some extent the disadvantage that agriculture thereby suffered, belongs, as known, principally to Justus v. Liebig; his works, that placed the theories of plant and animal production on a thoroughly

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scientific basis, appeared in the early forties and proved epoch-making; these, together with those of the author's contemporaries, such as Boussingault, Lawes, Gilbert, Weckerlin, Wolff, etc., soon made their way to Sweden and produced a very marked effect.

Among those who have contributed most effectively towards the advancement of Swedish agriculture by disseminating the knowledge of modern methods of work based on the principles of Natural Science, may be mentioned: *Joh. Arrhenius* (1811/89), University Lecturer on Botany, Principal of the Agricultural High School at Ultuna (1848/63), and Secretary of the Academy of Agriculture; by editing The Journal of Rural and Communal Economics (1840/61), The Handbook of Swedish Farming, and subsequently the Journal issued by the Academy of Agriculture, and also by writing a number of short essays on agricultural topics, Arrhenius proved himself an exceedingly indefatigable and valuable agent in the promotion of the best interests of farmers up and down the country. *J. Th. Bergelin* (1822/64), a pupil of Nonnen, was a contemporary of the last-named; his work on behalf of agriculture consisted principally in his editing The Journal of Swedish Farming, The Quarterly Review of Practical Farming, etc., and in translating the works of Thaer, Kühn, Liebig, and Vincent. *Hjalmar Nathorst* (1821/98) was somewhat later in the field; he filled the offices of Principal at the Agricultural High School of Alnarp (1862/86), and of Secretary at the Agricultural Society in the Län of Malmöhus. He was active in many ways in the interests of agriculture: he was the author of a number of manuals on stock-breeding, e. g., on cattle-rearing, on the rearing of pigs, and on sheep-farming, and of numbers of shorter essays; he translated very largely from the literatures of foreign countries on the same topics; he was, furthermore, a talented lecturer and public speaker and keen debater; with all these multifarious activities he may, in truth, be said to have been the most energetic and successful advocate of the cause of modern agriculture, and has perhaps done more than any one else in Sweden to foster its development.

Horses have been dealt with in works by *C. G. Wrangel* (born 1839), a well-known name even outside the bounds of Sweden, *V. Nauckhoff* (born 1839), *E. Abramson* (born 1864), a specialist on the Ardennes breed, and others.

In the field of Agricultural Chemistry a great deal of work has been done of considerable value. *Hampus v. Post* (born 1822), an eminent geologist and botanist, and lecturer at Ultuna, proved himself possessed of originality, especially as a conductor of experimental work and in such writings of his as Principles of Farming-Chemistry etc.; his researches on the Swedish looser soils and his creation of the accepted terminology for Swedish earth-varieties are among his best contributions to agricultural science and redound greatly to his credit. — No less noteworthy is the achievement of *Alex. Müller* (born 1828), the first agricultural chemist appointed by the Academy of Agriculture, in 1856; his achievements were not restricted to one, but touched upon almost all branches of the science. The development of the method of soil-analysis that stands to his account, the thorough study he gave to the earths, to methods of manuring and to the cultivating of peat-mosses, the attention he paid to questions of urban sanitation and wholesome drinking-water, etc., the results of all which were printed in Swedish and German publications, establish him as an unusually energetic and successful promotor of the cause which he had made his own, viz.: the improvement of the science of agricultural chemistry. *C. E. Bergstrand* (born 1830), also appointed agricultural chemist by the Academy of Agriculture, and the holder of other posts of distinction, carried out a great deal of research-work, and wrote a number of books, etc., of which may be mentioned The Principles of Agricultural-Chemical Analysis, The Composition of Fodder-Stuffs, An Examination of Stratified Marl, etc.

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Very great importance attaches to the exceedingly thorough and eminently practical researches in various fields, carried on by the late *L. Fr. Nilson* (1840/99); he, too, was a chemist on the staff of the Academy of Agriculture; of his works there may be mentioned here: Studies on the Percent of Fatty Matter in Cows' Milk, On the Gotland Soils, On Certain Feeding Materials and Swedish Forage-plants, etc. Among other noted agricultural chemists may be enumerated: *C. G. Eggertz* (born 1845), author of works on Vegetable Moulds in tilled Fields and Moor tracts and of Attempts at the cultivation of Moorland, etc.; *Albert Atterberg* (born 1846), also known through his classification of cereals; *Mats Weibull* (born 1856), a. o. *C. v. Feilitzen* (1840/1901) deserves mention as the head of the experimental work carried on under the auspices of the Swedish Moor Association. — Several noted scientists make culture-plants their chief study. *Jak. Eriksson* (born 1848) is known for his observations on Swedish cereal crops, but also, and more especially, for his work: Diseases attacking Cultivated plants, particularly Blight. *N. Hj. Nilsson* (born 1856), director of the unique experimental work so successfully carried on by the Swedish Seed Breeding Association, is pre-eminent for the efforts he has made in the improvement, multiplication, and systemization of culture-plants.

The history of agriculture has found exponents from time to time; among the number of these may be noted here the following: *P. v. Möller* (1809/83), »Stray Suggestions on the History of Swedish Agriculture», and other works; *H. Forssell* (1843/1901), »The Agricultural Industry in Sweden in the 16th Century», and other papers; and *Fr. Akerblom* (1839/1901), »Historical Notes on Cattle-breeding in Sweden».

Periodical literature on the subject of agriculture has been contributed to principally by *H. Winberg* (born 1844) and *N. Engström* (born 1851), who since 1880 have published »The Farmers' Journal» (Tidskrift för landtmän); furthermore by *W. Flach* (born 1857) and *H. Juhlin-Dannfelt* (born 1852), the editors of the paper »The Farmer» (Landtmannen), which first appeared in 1889. The last named is joint-editor with *N. Engström*, *H. Winberg*, and *A. Sjöström* (born 1861) in the publication Landtbrukets Bok (The Book of Farming), to a certain degree an encyclopædic work, intended to serve as a textbook at the Agricultural High Schools and to be a guide for the practical farmer.

Agricultural Education.

The institutions affording instruction in Agriculture stand under the control of the Royal Board of Agriculture and are of three types: *Agricultural Schools* (Landtbruksskolor), giving practical and theoretical instruction in the subject, partly beyond the elementary education; *Farmers' Schools* (Landtmannaskolor), affording a theoretical education in the trade; and *Agricultural High Schools* (Landtbruksinstitut), providing advanced teaching in the branch.

The first measures taken by the State or private individuals for furthering, by systematic instruction, the art and practice of agriculture, date from a period remarkable in every direction as regards the internal development of Sweden, the so-called »Era of Liberty» (1718/72). During this epoch, chairs were instituted at both the universities of the country (at Uppsala 1740, and at Lund 1750) for the furtherance of knowledge in »res rustica et agricultura». The founding of the *Academy of Agriculture* in 1811 was an advance of still greater importance. Some years later, people began to think of the need of having actual

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agricultural schools, on the model of that founded by Albr. Thaer at Möglin (Germany). A proposition to this end was made in the Riksdag as early as 1828. The first institution, however, for the instruction of those intending to devote themselves to the pursuit of agriculture came into existence through the initiative of a private individual, *Edvard Nonnen* (1804/62), a German, himself formerly a pupil at Möglin. That was in 1833. The institute, situated on the estate of Degeberg bordering Lake Venern, existed with some support from the State as a higher training establishment until the year 1852; up to that time nearly 200 pupils had passed through the school, many of whom afterwards became pioneers in the agricultural world in Sweden.

From the year 1834 onwards, propositions were made in the Riksdag for a grant to the erection of lower-grade *Agricultural Schools*, with a view to training young men practically in the establishment of farm enterprises; these grants were voted, and in 1840 the first institution of this kind was opened on the estate of Orup in Skåne, and others of a similar character were shortly established throughout the whole country. Sweden's first *Agricultural High School* was opened in the year 1848 at Ultuna near Uppsala, another one in 1862, at Alnarp in Skåne.

In 1884, a royal commission brought in suggestions for the re-organization of instruction in agriculture. One result of this was the foundation of the third kind of institution for the purpose, viz., the so-called *Farmers' Schools.*

The Agricultural Schools afford training and promote skill in the practical carrying out of the various kinds of farm labour, and, in some degree, give instruction in theoretical principles. The pupils have to enter into all species of labour on a farm and have to do duty besides as *foremen.* Indeed, the training of the pupils to become directors of labour may be regarded as the most important task of these schools. There are at present 26 Agricultural Schools, two being connected with the two Agricultural High Schools; of the others there is, in general, one in each Län. The annual number of the pupils is about 350.

The Agricultural Schools are usually to be found on some private estate and for the most part placed under the special direction of the Agricultural Society of the Län; they derive an annual grant from the State of 4,000 kronor each. The course of instruction extends over two years, for advanced pupils over one year. The theoretical instruction takes place in the morning and the evening during winter. Those entering must have reached their 18th year, be accustomed to farm-work, and have passed trough the minimum course of a Common School. Instruction, board, and lodging are provided free of cost.

The Farmers' Schools give, as mentioned above, an elementary *theoretical* form of instruction. They are most frequently stationed at the *People's High Schools* (Folkhögskolor, see p. 312) and form a continuation course for pupils at these. The pupils provide their own board and pay a certain fee for the instruction given. The schools derive support from the State to a maximum of 3,000 kronor each, on condition that their other sources of income bring in at least the same amount. The number of Farmers' Schools at present in existence is 20, with a total of about 260 pupils.

The time devoted to study at these schools is, as a rule, from five to six months, during winter. For entrance, a pupil must have reached his 18th

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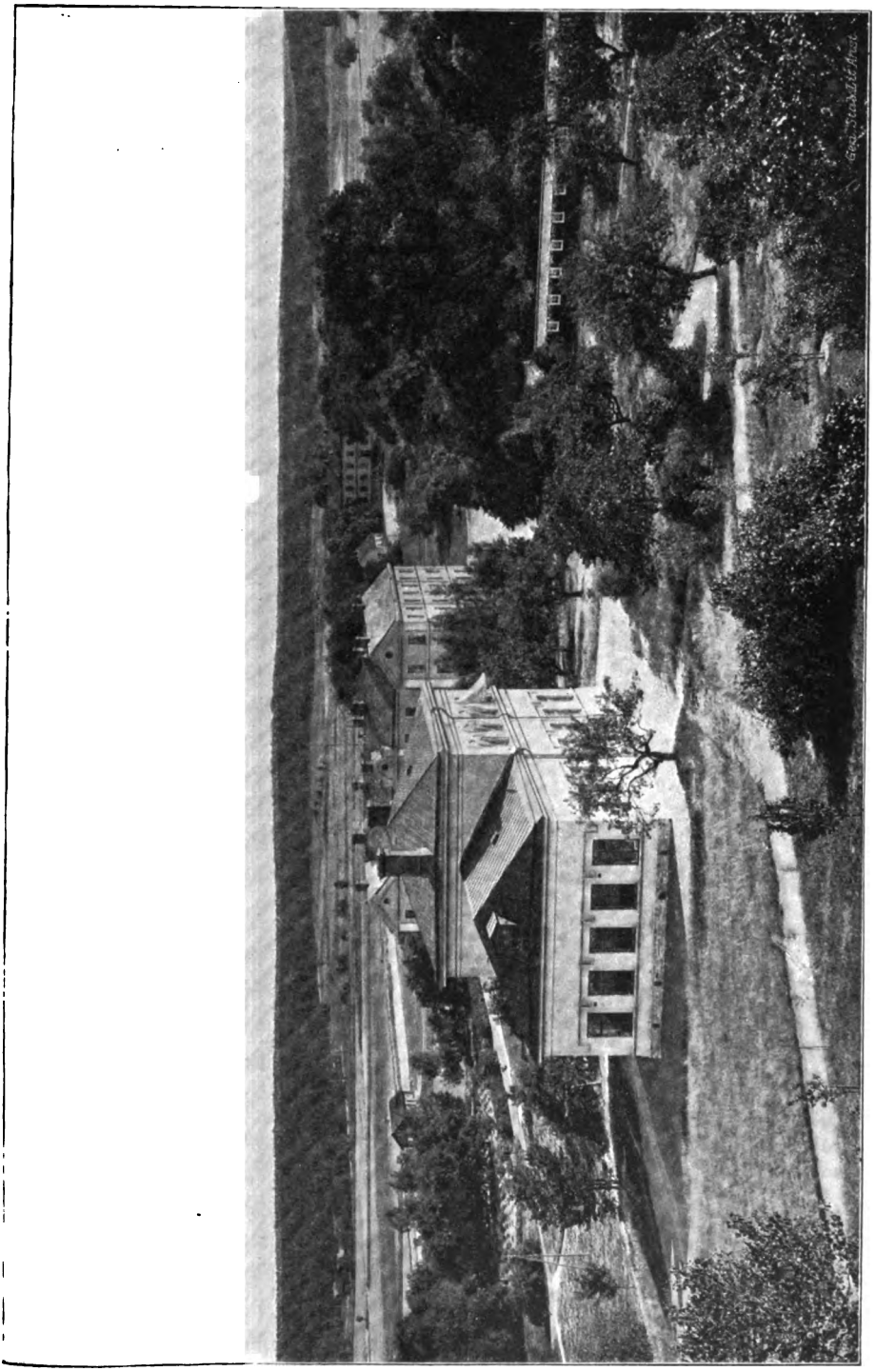

The Ultuna Agricultural High School.

Photo. ALFRED DAHLGREN, Uppsala.

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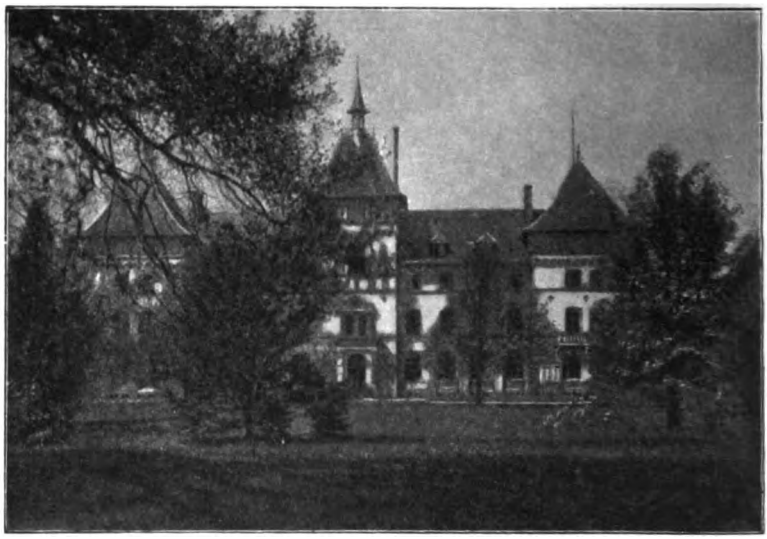
(à 20th) year and be able to show a certain degree of preliminary knowledge on the subject, equal to that acquired at the People's High Schools, and to have besides devoted at least one year's work to the pursuit of agriculture.

The Agricultural High Schools at Ultuna and Alnarp are designed to afford higher instruction in the principles underlying the exercise of farm-management. The course of instruction is a two years' one. Candidates for entrance must be at least 18 years of age, have had at least one year's practice as farmers, and possess a certain degree of preliminary knowledge, corresponding to the final examination at a Technical College (see p. 346), or to the course given in the upper sixth class on the scientific line at the State Colleges.



The Alnarp Agricultural High School.

The subjects of instruction at the High Schools are: a) *Fundamental subjects:* Practical Mathematics, Mechanics, Physics, Meteorology, Chemistry, Geology, Botany and Zoology, the Anatomy and Physiology of Domestic Animals, Field-surveying with Leveling and Drawing; b) *Chief subjects:* Agriculture, Study of Domestic Animals, Dairy-farming, Machine, Implement, and Building construction, the Theory of Agricultural Economy, and Book-keeping; c) *Subordinate subjects:* Care of Domestic Animals in Sickness, Forestry, Gardening, Political Economy, Financial Law, and the Laws on the communal self-government.

The instruction is given by Lectors, Adjuncts, and Assistant Masters. One of the Lectors is appointed by the Government to be *Warden* (Rector) for a space of five years and he has to superintend and preside over the High School. The farm work is conducted by a *Steward* under the superintendence of the Board of Directors; it is his duty to demonstrate to the pupils the different features of the work being pursued on the estate. The High School itself and the management of the estate are under the supervision of the said *Board*, which is appointed by the Government.

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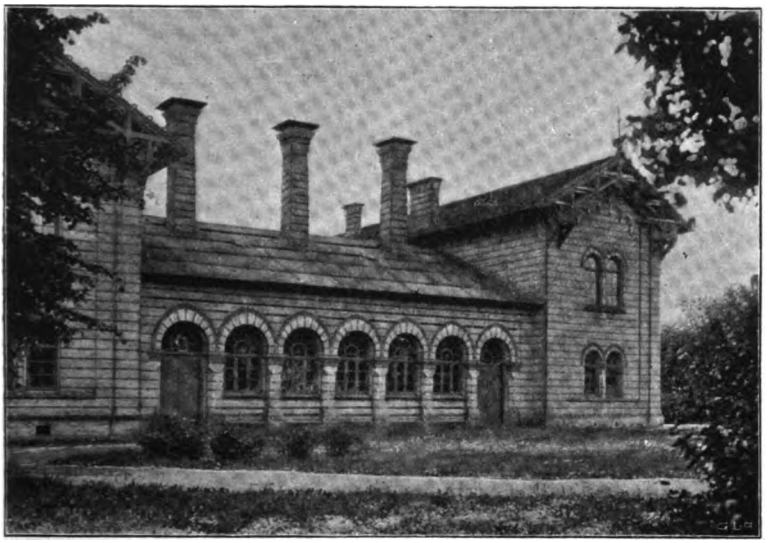
The pupils at these colleges have no share in the farm work. They are at their own charges for board at the High School, and contribute to the cost of their instruction to the extent of 100 kronor a year. For pupils who desire to continue their studies at the High School there is a limited number of *scholarships*, entitling to certain advantages. In 1902, the number of pupils at the two High Schools was 63.



Farriery School at Alnarp.

Among the institutions for the teaching of Agriculture are also to be reckoned the three **Farriery Schools**: at Alnarp, in Stockholm (in connection with the Veterinary Institute there), and in Skara. The one at *Alnarp* was opened in 1863, its founder being Dr. *O. Pehrsson-Bendz* (1831/1901), a pioneer in the field of rational farriery, who made his name widely famous by this institution. The school possesses a building of its own, magnificent of its kind, which was completed in 1877. Pupils flock from all parts of the kingdom to this educational institution, both civil and military farriers among them; the number of pupils down to 1902 was 1,432, divided over 120 courses. Instruction is imparted by teachers at the Alnarp Agricultural High School and by the School's instructing smith. — At the farriery school in *Skara*, located at the estate Brogården — the former veterinary institution (see below) — instruction is afforded in farriery and the care of sick domestic animals to civil as well as military farriers. The school employs a superintendent (veterinary) and an instructing smith.

As regards the instruction in **Dairy-farming,** — an industry that in the last decades has grown to such an importance for the Swedish agriculture — this has been treated of in the foregoing, on page 588.

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The Veterinary System.

At the initiative of Karl von Linné (Linnæus), the Swedish Government, in 1763, sent out three young men to the Veterinary College at Lyons, which had been opened the preceding year, to study »ars veterinaria» under Bourgelat. One of these young men was *Peter Hernqvist* (1726/1808), to whom, after completing his studies at Lyons and Paris, and after being appointed lecturer in physics at the State College in *Skara*, was given the use and occupation of the estate of Brogården, where, in 1775, he opened his famous *Veterinary College*, and in his will he bequeathed the whole of his considerable fortune to this school. Hernqvist's most eminent pupil, *Sv. Ad. Norling* (1786/1858), continued his master's work and, in 1821, founded a veterinary college at Stockholm, the beginning of the present Veterinary Institute. In Southern Sweden, *A. H. Florman* (1761/1840), Professor of Medicine at the University in Lund, worked for the development of the veterinary system during the latter part of the eighteenth century.

The Veterinary College at Skara was discontinued in 1889, and since then the **Veterinary Institute** in Stockholm has been the only school in the Kingdom for training veterinarians. According to the Regulations of May 24, 1867, a certificate of admission to the university is required on entering the Institute. The teachers are five professors, one of whom is also the Principal of the Institute; besides one lecturer, one assistant, and one instructing smith (veterinary), one assistant teacher in the analysis of meat, one prosector, and one riding-master. The regular course of study is to last four or five years, and the instruction is equal to that of corresponding institutions in other countries. The number of pupils generally amounts to 40 or 50.

The veterinary surgeons salaried by the State are: 32 provincial veterinarians, 14 army veterinary surgeons, 18 assistant veterinary surgeons, and 5 field veterinary stipendiaries. Moreover, there are two teachers at the Agricultural High Schools, and two at the stallion and remount depôts. The total number of veterinary surgeons in the kingdom is 340.

Agricultural Credit Establishments.

The Palmstruch bank, the oldest in Sweden, in 1656 obtained Royal privilege to advance money on »palaces, estates, lands and cuttings, fields and meadows, etc.» *The Bank of Sweden* (Sveriges Riksbank), founded in 1668 — its predecessor, the Palmstruch bank, having ceased to exist, — undertook loans on security of landed property.

At the beginning, loans were advanced for short periods but gradually lapsed into standing ones. Hence, the funds of the Bank came to be locked up to far too large an extent. In order to facilitate the banking business without considerable detriment to agriculture, the »Secret Committee» of the Riksdag, in 1752, decreed that a yearly instalment of capital should be made in the case of loans of ten years' standing. A system of amortization was herewith established, which in 1772 became law, with the decree of a general reduction per annum of two per cent. This remained in force till 1859. At the same time, in 1772, interest was fixed at 4 per cent. The limit of a loan was half or two thirds of actual value. — From 1770 to 1815, no loans were granted on agricultural property as the Bank had no available funds for the purpose.

The difficulties which arose for the Bank of Sweden from having its funds locked up in agricultural loans of long standing, gave rise

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to the establishing of the **Mortgage Societies** (Hypoteksföreningar). The Mortgage Society of Skåne was founded in 1836. Then came that of Östergötland in 1845, of Småland in 1846, of the Mälar Provinces in 1847, of Örebro Län in 1849, of Vermland in 1850, of Elfsborg a. o. Läns in 1851, and of Gotland in 1853. Those of Gefle-Dala and of Norrland followed in the rear.

The Mortgage Societies were, to begin with, private institutions independent of each other, which, by the sale of their shares, chiefly aimed at obtaining amortization loans for their members on the security of first mortgages on real property. Mutual rivalry on the share market, however, proving mischievous in its consequences, the **General Mortgage Bank of Sweden** was founded, agreeable to the ordinance of April 26, 1861. Its chief mission was to negotiate all the loans required to procure the Mortgage Societies means for their loans. Moreover, a loan of about 6 million kronor was made over by the Bank of Sweden to the Mortgage Bank, on security of mortgage in landed property. The Mortgage Bank obtained the monopoly of issuing bonds payable to the holder against security of mortgage on real property in the country, and the State handed over to it a capital-stock of 8 million kronor in Government bonds. By the enactment of May 16, 1890, this capital-stock contributed by the State was increased to 30 million kronor.

The Mortgage Bank is administered by a *Board* of five members, amongst whom the president is constituted by the Government, the vice president by the commissioners of the National Debt Board (see p. 204), and the three remaining by deputies from the Mortgage Societies. Out of the five auditors, one is elected by the National Debt Board and the other four by the societies. In the regulations of the bank, which are sanctioned by the Government, no alterations can be made without the consent of the Riksdag.

The Mortgage Societies are likewise administered according to statutes sanctioned by the Government. They are allowed to grant loans only against security in land, and estimation is made on strict principles and without allowance being made for the value of houses or forest. A loan must on no condition be granted exceeding half of the value estimated in this way.

The present conditions for new loans are: *a*) 4 % interest and 1/2 % amortization; *b*) 4 % interest and 2 % amortization; and *c*) 4 % interest without amortization. In each case the borrower has the right to give notice of payment after ten years. With *a*) and *b*) loans can be granted up to half the value of estimation, with *c*) only to one third of it.

The members of each society (i. e. the borrowers) are conjointly responsible for the bonds of the society, each one in proportion to the amount of his remaining debt to the society. The societies are conjointly responsible for the bonds of the Mortgage Bank, each in proportion to its remaining debt to the bank.

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The following Table shows the amount of **Loans lent** to the Mortgage Societies by the Mortgage Bank during 1861/1902:[1]

In	Kronor.	In	Kronor.	In	Kronor.	In	Kronor.
1861.....	16,053,756	1872.....	15,634,167	1883.....	10,256,427	1894.....	1,149,940
1862.....	22,294,287	1873.....	8,496,388	1884.....	10,217,093	1895.....	290,230
1863.....	8,611,198	1874.....	12,519,175	1885.....	10,480,523	1896.....	757,946
1864.....	1,231,287	1875.....	11,794,537	1886.....	8,099,599	1897.....	251,446
1865.....	3,163,581	1876.....	11,312,389	1887.....	5,943,301	1898.....	4,782,297
1866.....	1,841,902	1877.....	6,606,452	1888.....	2,140,533	1899.....	12,017,587
1867.....	8,161,714	1878.....	17,880,686	1889.....	44,867	1900.....	4,820,761
1868.....	9,219,955	1879.....	28,542,331	1890.....	2,427,607	1901.....	3,992,099
1869.....	16,937,158	1880.....	21,817,038	1891.....	1,238,118	1902.....	8,485,517
1870.....	13,374,201	1881.....	18,795,845	1892.....	2,756,898		
1871.....	12,591,082	1882.....	12,965,778	1893.....	3,376,734		

The position of the Mortgage Societies at the end of 1902, with regard to the Mortgage Bank concerning loans received, is evident from the following synopsis:

Interest.	Amortisation.	Original amount of loan.	Amortisation effected.	Balance of debt.
5 %	3/4 %	201,585,832 kr.	69,351,458·01 kr.	132,234,373·99 kr.
4 3/4 %	1/4 %	54,482,410 »	1,805,450·19 »	52,676,959·81 »
4 %	3/4 %	21,107,230 »	2,318,435·87 »	18,788,794·13 »
4 %	2 %	4,902,900 »	291,158·83 »	4,611,741·17 »
4 %	1/2 %	63,269,770 »	1,536,392·64 »	61,733,377·36 »
4 %	—	2,045,000 »	— »	2,045,000·— »
	Total	**347,393,142** kr.	**75,302,895·54** kr.	**272,090,246·46** kr.

Concerning the **Bond loans** raised by the Mortgage Bank and not yet fully amortized at the end of 1902, particulars are given in Table 82.

TABLE 82. *The General Mortgage Bank bond loans.*[1]

Loan taken up.	Original rate of interest, %.	Kind of coin.	Original amount. Kronor.	Ordinary time for amortization.	Increased amortization can take place.	Bonds in circulation 31/12 1902. Kronor.	Present rate of interest, %.
In 1877...	5	Kronor.	50,000,000	In 1927...	—	13,106,600	5
» 1878...	4	German Mark.	120,000,000	1959...	—	38,744,800	4
					1905	72,397,066	4
» 1879...	4	Francs.	36,000,000	1939...	—	25,579,800	4
» 1880...	4 1/2	Kronor.	75,000,000	1956...	1907	41,079,400	4
					1907	15,653,100	3 3/4
» 1883...	4 1/2	Kronor.	50,000,000	1959...	1907	10,208,900	4
					1907	16,229,100	3 3/4
» 1886 ..	3 1/2	German Mark.	64,000,000	1962...	1901	35,423,200	3 1/2
» 1889...	3 1/2	Kronor.	75,000,000	1959...	1898	19,114,400	3 1/2
		Total	**470,000,000**	—	—	**287,536,366**	—

Under the superintendence of the State and with subventions from it, the General Mortgage Bank of Sweden has secured to itself a great confidence and enjoys a most trustworthy credit. Its bonds have also since far back been valued at rates of exchange nearly corresponding to those of the Swedish State bonds.

[1] A krona = 1·10 shilling or 0·268 dollar.

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Mortgage on Real estate.

Sweden's official statistics give an annual report on the amount of mortgages granted and voided, and they also effect a calculation on the entire remaining debt, but, as no distinction is made between landed property and other real property, there is no way of finding out the debt resting upon the soil. At a certain idea on this point one may, however, arrive by the fact that the statistics in question make a difference between country and town. At the end of 1880, 1890, and 1900, the entire debt mortgaged on real estate and compared to the assessed value, was estimated at (in kronor à 1·10 shilling or 0·268 dollar):

		Assessed value.	Mortgaged debt.	In %.
In the country.	In 1880	2,302,306,035 kr.	795,691,445 kr.	34·5
	1890	2,463,186,845 »	977,629,214 »	39·7
	1900	2,862,072,050 »	1,193,540,696 »	41·7
In the towns.	In 1880	732,478,366 kr.	329,893,782 kr.	45·0
	1890	1,150,514,171 »	641,662,615 »	55·8
	1900	1,639,620,830 »	962,240,628 »	58·7
Total.	In 1880	3,034,784,401 kr.	1,125,585,227 kr.	37·1
	1890	3,613,701,016 »	1,619,291,829 »	44·8
	1900	4,501,692,880 »	2,155,781,324 »	47·8

Between 1880 and 1890, the mortgaged debt thus increased very considerably, both absolutely and relatively, but since 1890 the increase has, in proportion to the assessed value of property, been less prominent.

Of the various *Läns*, the mortgage percentage was, in 1900, highest in the Län of Jemtland (66·1 %) and in the city of Stockholm (63·8), whereas it was lowest in the Läns of Vesterbotten (22·4) and of Vesternorrland (33·2). In our richest province, Skåne, the mortgage percentage is rather high, viz., in the Län of Malmöhus 53·2 % and in that of Kristianstad 53·7.

Loans and subventions for Cultivation.

For drainage of lakes and watery grounds and for cultivation of the soil drained, loans out of the public funds are granted on certain conditions. For this purpose there exist two **Cultivation loan funds,** the Old and the New one, administered by the Exchequer Department. Loans from the New cultivation fund are granted up to an annual total of 1 million kronor at the most, and they must in each case be limited to that amount, at the utmost, which is required to cover the costs for drainage and ditching. The loan-taker must find security for the draining and ditching as well as the cultivation itself being completed in due time. On the sum lent no interest or amortization is paid during the five (at present six) first years, but on the amounts drawn during the time appointed, an annual interest of originally 5, at present 3·6 % is charged, which at the end of those five (now six) years is added to the capital. In special cases the Government can fully release from interest, at most for five years. According to the original proviso of 1883, 10 % — out of which 5 % interest — should be paid on the amount thus accrued from the sixth year inclusive till the loan had been fully discharged; but in 1885, the annuity for loans granted after that time was reduced to 8 %, of which 4½ % interest. In 1895, the interest was further reduced to 4 %; in 1898, the annuity to 7 and the interest to 3·6 %; and, in 1901, respectively to 6 and 3·6 %. The annuities are apportioned on those farms and holdings which are partakers in the cultivation, and are collected together with

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the taxes. During 1884/1901, 9,621,930 kronor were granted as cultivation loans for 414 different undertakings, by which 80,576 hectares (à 2·47 acres) had been drained. These numbers, however, show that the sum allowed of 1 million kronor per annum has not nearly been laid claim to. The reason of this is the conditions having been considered too hard.

Of late, the Riksdag has, moreover, granted *subventions* (for 1902, an amount of 400,000 kronor) to the furtherance of bog-draining and tapping, undertaken with the purpose of **diminishing the liability of freezing** in the neighbouring districts. During 1884/1901, 2,453,973 kronor were granted as subventions to 641 such enterprises — about 80 % of which have gone to the three most northerly Läns.

Agricultural Societies.

In the beginning of the 19th century, Agricultural Societies were organized in some provinces, which in 1813 were given an official stamp, when, at the initiative of the Agricultural Academy, it was decided that the constitutions of the Societies should be confirmed by the Government. The aim of the Societies was »to improve rural economy by giving information, suggestions, encouragement, or rewards». It did not take many years before there were Agricultural Societies in all the Läns of the Kingdom (except, of course, the Capital). As the Läns of Kalmar and Elfsborg have two Agricultural Societies each, the whole number is at present 26. The members of these Societies meet once or twice annually, and the business is for the rest managed by a *Managing committee* with a chairman and a secretary. A thing to be desired were an organization more firm than the present one, which undoubtedly is very loose.

TABLE 83. *Revenue and Expenditure of the Agricultural Societies.* In kronor.[1]

	Average 1882/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1899.	In 1900.[2]
Revenue.						
Membership-fees	13,654	15,139	18,274	21,741	22,360	24,068
Interests, rents	132,466	130,247	143,466	181,849	197,440	227,041
Share of spirit-sale fees[3]	804,386	750,170	900,352	1,208,013	1,360,674	1,441,054
State grants	86,065	106,819	192,164	312,970	331,468	340,116
County Council grants	53,012	67,750	83,510	129,738	130,410	182,935
Cattle sold	46,987	37,982	58,184	55,387	80,756	5,181
Other income	51,294	72,330	36,127	76,582	118,504	20,888
Total	1,187,864	1,180,437	1,432,077	1,986,280	2,241,612	2,241,283
Expenditure.						
Farming in general	266,687	255,666	309,430	424,729	441,834	468,757
Horse-breeding	110,079	70,771	111,412	174,545	186,430	150,902
Cattle and dairies	103,381	139,119	264,168	336,967	354,519	341,592
Other Live stock	4,526	2,798	7,655	11,296	10,430	18,322
Veterinary affairs	47,055	52,640	60,394	75,390	76,498	81,864
Gardening	59,287	48,366	48,587	65,222	75,712	75,975
Forestry, gamekeeping	76,162	73,767	83,281	116,935	123,543	133,528
Fisheries	43,544	30,006	33,582	47,872	50,196	65,443
Domestic industry	127,337	107,259	106,269	130,153	118,480	164,089
Meetings and exhibitions	109,519	68,036	62,393	80,516	84,147	99,912
Administration	142,802	139,170	151,410	178,834	191,665	197,562
Other expenses	79,027	83,950	100,087	149,062	251,006	132,388
Total	1,169,406	1,071,548	1,338,668	1,791,521	1,964,460	1,930,334

[1] A krona = 1·10 shilling or 0·268 dollar. — [2] For this year the classification of revenues and expenditures have undergone some changes. — [3] See p. 282.

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These Agricultural Societies, the work of which has proved very useful, derived their principal income, up to 1855, from the fees of their members only. From that time they have had a certain part of the fees on the sale of spirits at their disposition (see p. 282), by which they have been enabled considerably to extend their field of activity. For this purpose they also draw subsidies from the State as well as from the County Councils. The Agricultural Societies are to send in to the Board of Agriculture annual reports in regard to their work, and to furnish statements and information called upon by the Board.

The revenue and expenditure of the Agricultural Societies are shown in Table 83. In 1901, the Agricultural Society of Malmöhus Län had the largest income, being 201,142 kronor, and the North Society of Kalmar Län the smallest, being 33,471 kronor. The total revenue of all the Societies for the same year amounted to 2,456,653 kronor.

The surplus capital of the Societies amounted at the end of 1880 to 3,454,831 kronor, at the end of 1890 to 3,658,209, and at the end of 1900 to 5,414,198 kronor. Inclusive of funds for special purposes (formed by donations or otherwise), the total amounted this last mentioned year to 5,685,028 kronor. The fact that so considerable *public* funds are administered by these private societies appointing their own boards of directors and electing their members, is indeed a peculiar feature of Swedish »self-government». — The number of members, which in 1890 amounted to 26,369, had in 1901 increased to 41,873.

A matter especially incumbent on the Agricultural Societies is the collecting of the material to the **Agricultural Statistics.** The manner of obtaining such material is, however, left to the discretion of each Society, as a consequence of which circumstance the material collected is of a very unequal value. Most of the Societies seek to gain their object by yearly, careful investigations of smaller parts of the district, until the same has been wholly explored, when a new series of investigations is commenced. The data collected are published by the Central Bureau of Statistics, which, moreover, publishes preliminary estimates on the *crops*, founded on the accounts of the constables regarding the amount of crops yielded per each bushel sown. These preliminary figures are published even before the end of the civil year, while the more extensive reports of the Agricultural Societies appear only after the expiration of a year. A reorganization of the Swedish Agricultural Statistics is at present (in 1903) under deliberation.

Offices of Chemical Analysis.

The object of these offices is to promote the development of farming and the trades by giving advice and information, and especially by means of analyses of farm produce, technical products, and the like. The first public offices of this kind were established in 1876, viz., at Skara, Halmstad, Kalmar, and Vesterås. In 1881, one office was started at Örebro, in 1885 two, viz., at Jönköping and Hernösand, in 1895 one at Luleå, and finally in 1900 one at Visby. To each of these nine **State offices** of chemical analysis the State gives a subsidy of 4,000 kronor per annum (exceptionally, however, to the office at Luleå 5,000); they enjoy support besides from Agricultural Societies or County Councils, varying from 2,000 to 5,300 kronor. Then there is the income from fees for analyses made, which varies from 1,300 to 6,000 kronor. All these offices, with the exception of that at Jönköping, are connected with *offices for seed-controlling* (see below) under the management of one and the same director. — Regulations for the work of these State offices were issued for the first time in 1877; those at present in force bear the date of June 7, 1900.

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Certain **Agricultural Societies** and **County Councils** have also successively established separate chemical laboratories and Controlling-offices of public analysis within their own districts, with a view to giving the husbandmen of their respective Läns an opportunity to get analyses made at a lower cost. These establishments are either connected with State institutions, as is the case with the chemical offices of the State Agricultural High Schools at Alnarp and Ultuna, or with private Institutes of the kind, with the bureau of the City chemist, etc., as at Molkom, Gefle, Umeå, Borås, Gothenburg, and Kristianstad. These seven offices have State subsidies varying from 600 to 2,500 kronor. Some of them have also a department for *seed-controlling*, others for *milk analysis*. Dairy-farming having made such rapid progress of late years, it has been necessary to have milk analyses made on a large scale, and at a low cost. Besides the aforesaid chemical offices, there are six *special offices for milk analysis*, which likewise have subsidies from the Agricultural Societies.

At the State chemical offices there were made, in 1901, as many as 53,599 analyses, and at those of the Agricultural Societies, about 37,000. At the offices of milk analysis there were made during the same year about 57,600 tests.

Some of the chemical offices are at the same time also *Experimental establishments* where experiments are made, on a smaller or larger scale, as to the *cultivation of plants*. Such is the case with the offices at Kalmar and Luleå, the latter designed proximately as a *Phyto-biological* office, where experiments and investigations are to be made in regard to the kinds of fodder-plants, and the like, especially suited to the climate of Norrland. At some of the experimental establishments local manuring experiments are made for the purpose of giving information to the farmers as to the most suitable manuring of their fields and meadows. Exclusively intended for the making of experiments are the Experimental Grounds of the Academy of Agriculture at Albano, near Stockholm (see p. 377), and the Forsse Experimental Grounds in Vestergötland.

The subsidies accruing to all these 22 offices of analysis from the State amounted in 1901 to 36,000 kronor, and from Agricultural Societies and County Councils to about 46,000 kronor.

Offices for Seed-controlling.

In 1869, the first establishment for analysis of grain and seed was founded in Germany, under direction of Prof. Fr. Nobbe; some years later, in 1876, public analysis of seeds was introduced into Sweden, at Nydala in the Län of Halland. Swedish public analysis of seeds has thus been able to celebrate the twentyfifth anniversary of a work which in more than one respect has proved so useful to agriculture. At present, there are in our country 19 offices supported by public subsidies. These offices were at first supported only by subsidies from the Agricultural Societies, but as early as 1887, the Riksdag placed 10,000 kronor at the disposal of the Government to be employed in support of such offices to which the County Councils and the Agricultural Societies contribute by an amount at least equal to that of the State subsidy, and which would submit to the regulations laid down by the Government. The instructions for the *Seed-controlling offices* issued by the Royal Board of Agriculture, and now in force, bear the date of June 26, 1900, and are similar to the regulations for the analysis of seeds at the same time adopted in Denmark and in Norway. In 1901, the total number of analyses made at these establishments amounted to 11,273, while 3,743,357 kilograms of seeds were leaded. This same year there were drawn out of public funds, besides the aforesaid 10,000 kronor from the State, 16,567 kronor from the County Councils and the Agricultural Societies.

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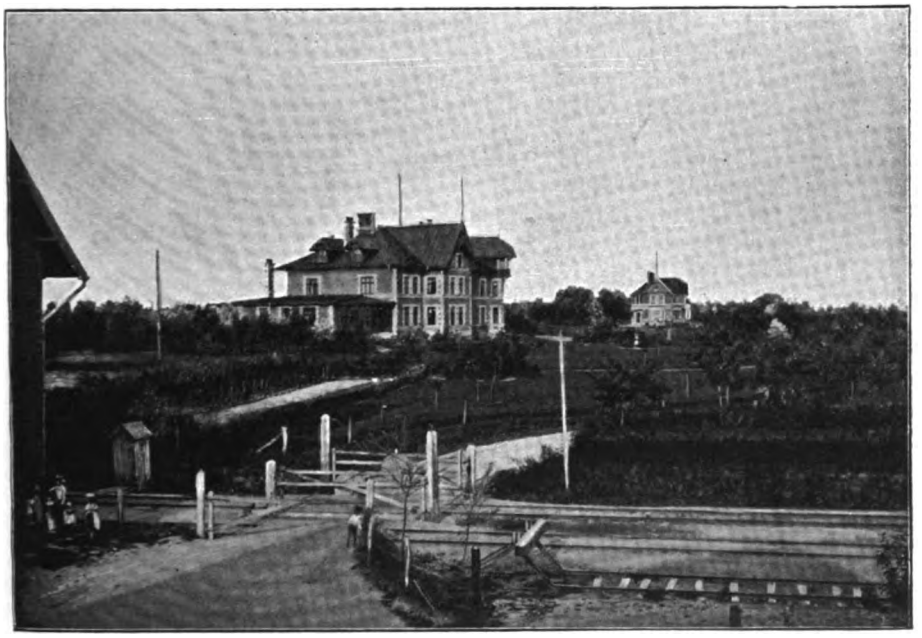
The Sowing-seed question.

Among agencies at work in the domain of Swedish agriculture, the initiatory step taken in the decennium 1871/80 for a greater utilization of the grain and seed harvests of Sweden deserves special attention. It is asserted according to a frequently cited experience that the harvests of a cold climate sown in warmer countries will yield a hardier, earlier, and more abundant crop than could otherwise be obtained there. Consequently, it was considered possible that an exportation of Swedish grain as seed to the European Continent might be turned into a source of income of some importance. This question was also repeatedly agitated on the platform and in pamphlets, at congresses and exhibitions, and samples were sent abroad and cultivation experiments were made on quite a large scale. The practical results expected did, however, not appear — a natural consequence of the blind reliance on the supposed merits of the northern origin, which made the senders of these samples forget to give due consideration to acceptable quality and purity of sort. Nevertheless, this movement has produced important results, first by directing greater attention to the growing of plants, secondly by giving an impulse to the improvement of Swedish plants, and thirdly by initiating the introduction of a regular system of control.



The Office at Svalöf.

In connection with the aforesaid first movement, several seed-culture societies were founded in the decennium 1871/80, but were soon either discontinued or played but a local rôle. But in 1886 »Svalöfs förening» (the Svalöf Society) was founded by Birger Welinder and F. Gyllenkrook, first but as a private enterprise, and with the intention of embracing only Southern Sweden. Already the following year it was extended, however, and became a society in common for

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the whole of Sweden; since 1891, it has enjoyed a State subsidy of 15,000 kronor per annum, and about as much from the Agricultural Societies in Sweden jointly. In 1894, this society received into its organization a similar society formed at Örebro in 1889 for Central Sweden, and since that time it represents alone the work of improvement of agricultural plants in Sweden. A large branch for Central Sweden has, however, been established at Ultuna. The Society now consists of 750 members, and the total annual income is about 52,000 kronor.

The Swedish Seed Breeding Association (Sveriges Utsädesförening) has the same object in view as referred to above, but, on account of the very experiences gained, aims at attaining this object primarily by means of an essential improvement of the plant-culture of Swedish farming, brought about by a *systematic raising of new and better sorts* than those hitherto existing. The untiring labours of this society since 1886 are now annually producing results which indisputably show that the right course has been entered upon and that it is really possible to attain the high aim in view. Its principal establishment, at *Svalöf* in Skåne, is already widely known both in and out of Europe, and is annually visited by numerous foreign students, and its new sorts of seeds are, moreover, widely cultivated in Sweden and also beginning to attract the special attention of other countries.

This decided success, quite unexpected in a country situated so far north and so little favoured by nature, is in the first instance to be explained from the fact that this is actually the first time that an establishment fully equipped with the resources of science has been founded *exclusively* for the purpose of improving the plants cultivated in agriculture. In this respect, the institution at Svalöf is still alone of its kind in the world.

Hitherto the work has been prosecuted as regards wheat, barley, rye, and oats, peas and vetches, and large assortments of entirely new varieties of each have been raised, only a few of which, however, after most careful trial, have been brought into the market. In regard to the method of working, it may suffice to state that it has gradually developed into *pure applied botany;* however, in the treatment of the material in the field, adhering more closely and directly than any former method to the culture at large.

In connection with the experimental establishment of the society, there is a business undertaking under its control, viz., the *General Swedish Sowing-seed Company, Limited* (Allmänna Svenska Utsädesaktiebolaget), which receives, purifies by cultivation, and introduces into the market the new sorts produced by the establishment. Both establishments are, for the rest, entirely separate, each with its own financial management and staff of employers, estates, buildings, etc. There is at Svalöf an area of over 600 hectares (1,500 acres) of excellent soil at their joint disposal for operations and »*elite* cultures».

The Swedish Moor-Association.

In 1886, at the initiative of Director *Carl von Feilitzen* (1840/1901), a Society of the above description was founded for Central and Southern Sweden, but in 1888 its boundaries were extended so as to comprise the whole country, under the name of »*Svenska Mosskulturföreningen*». The purpose of the Society is to further the cultivation of the moors, which is especially important in our country, and by lectures, meetings, experiments, publications and other suitable means to spread information concerning the cultivation of moorland, and the use of moss-litter and peat for industrial purposes. The area of such moor and turf land amounts in Sweden to 5,200,000 hectares (nearly 13 million acres), or about 12·6 per cent of the whole land area of the country, which will clearly show the importance of the Society and its field of labour.

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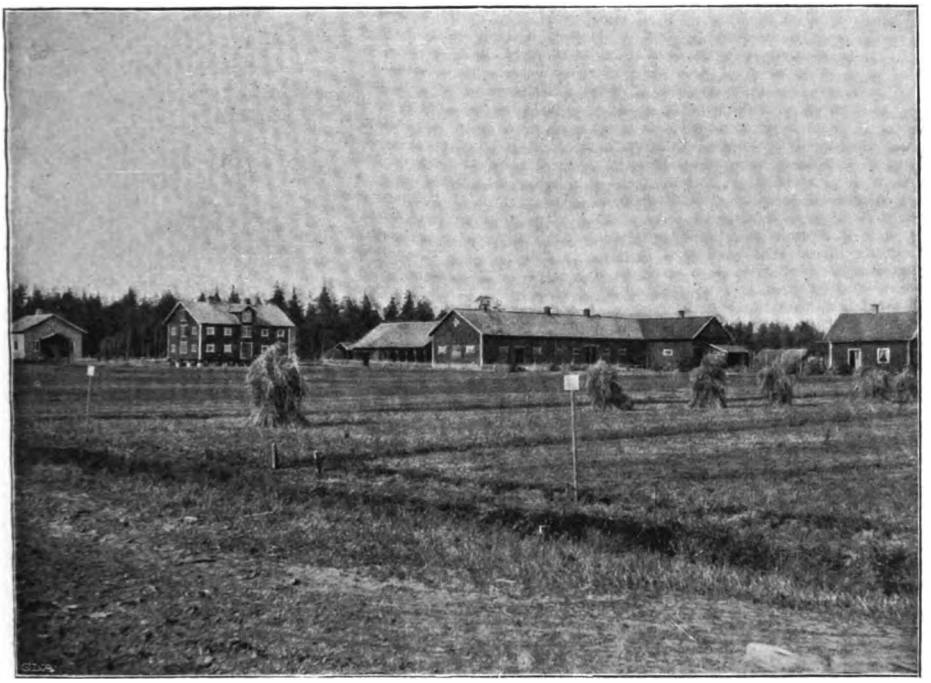
Since 1903 the Society has its own *Institute building* in Jönköping, containing chemical and botanical laboratories, offices for the director and assistants, a library and a museum containing objects relating to peat and turf from an agricultural and industrial point of view.

Adjoining this house there is an experimental garden, where pot and plot experiments on a large scale are carried out to elucidate different questions respecting the employment of Phosphates, Potash salts, and Nitrogen manures on different peat-soils, and for different plants; liming and the use of sand and clay on peat-soil, etc. In the garden there are both zinc pots and larger vessels of wood (pits) filled with peat-soil; and the experiments are carried out with scientific accuracy. At present there are 855 pits with an area of 0·3 to 1 square meter each, and 172 zinc pots.



Main farm of the Swedish Moor-Association, Flahult.

At *Flahult*, 12 kilometers from Jönköping, the Society has an Experimental Farm on moorland, where *field experiments* are carried out. The whole area of the farm is 125 hectares (300 acres), of which 34 hectares (85 acres) are at present cultivated.

At Flahult there are also two small *moor farms* arranged after the German model, in order to raise interest in the moor cultivation question. Each of these moor farms embraces 8 hectares, with a dwelling house and stable. The farm is worked according to the regulations laid down by the Society.

Further *field experiments* have been made *in different parts of the country*, their number being, in the year 1902, 45, in 16 different Läns. The northernmost, now discontinued, was situated at Korpilombolo, on a latitude of 67° and was thus the most northerly in Europe.

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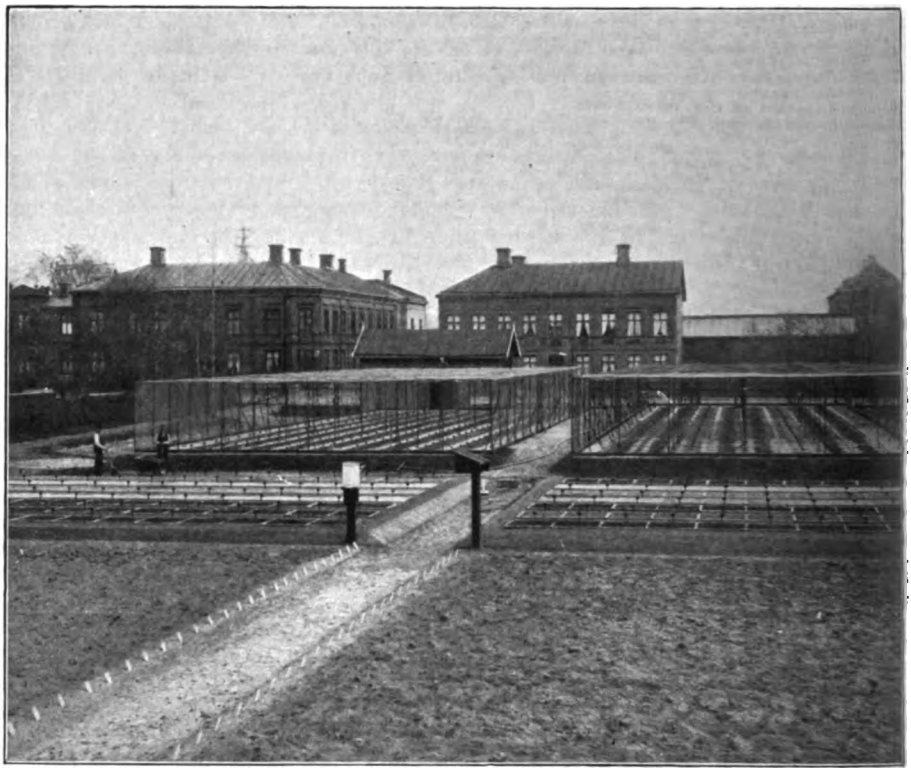

The Experiment Garden of the Swedish Moor-Association.

A very great number of *chemical analyses* have been made on the cultivation value of the peat-soil, on moss-litter, and peat for fuel; to which may be added analyses of grain, straw, hay, and the different kinds of fertilizers employed in the experiments, the results of which are published in the Journal of the Society, which appears every second month. Moors in different parts of Sweden are being examined by the assistants, and practical advice about cultivation and other questions is given to the farmer by the Society's Farm Manager.

At the larger agricultural exhibitions, and at its own expositions the Society presents an account of the results of its work; two annual meetings are held, at which questions are discussed, and the summer meeting is usually held in connection with excursions to some moor-land farm worth seeing.

The work of the Society is carried out by a director and four assistants. The income was, in the year 1902, 55,447 kronor (State 15,000; contributions from Agricultural Societies, 16,500; fees of members, 11,688).

In the year 1903 there were 3,352 members.

Farmers' Societies.

In most provinces of our country the farmers have found the forming of Societies to be a powerful means of promoting their common interests. The aim of these Societies — the agricultural clubs and the farmers' societies — is to

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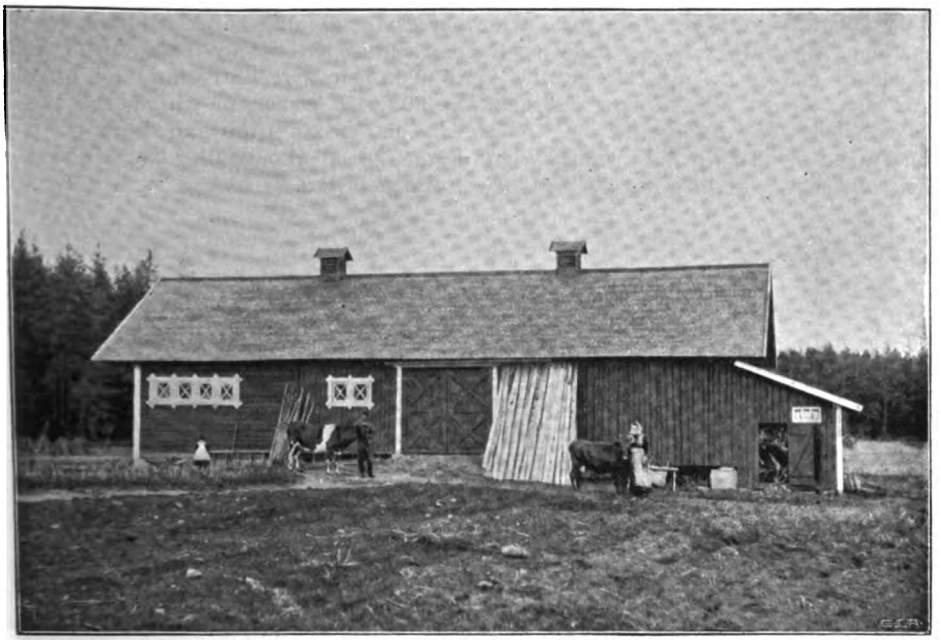

Farmyard of a Moor-farm at Flahult.

give an opportunity to the exchange of thoughts and opinions by discussions and arranging of lectures on agronomical subjects; or else it is of an economical nature. Of the latter kind are the Societies for purchase, horse-breeding, thorough-bred bulls, dairies, and pig-butcheries, etc. As, however, there exists no co-operation between the different societies, they are not promotive of as much good as they ought, and the farmers of Sweden have not yet learnt to fully realize the importance in the service of agriculture of associating themselves, and the necessity of a close union, in like manner as has been brought about in Germany and several other countries.

In 1895 the association »Sveriges Agrarförbund» (förbund = association) was organized, with the object of uniting all the farmers of the country, in order to contribute to the solving of questions of economic and economic-political importance to agriculture and kindred trades. The association meets once annually, but meetings are also held by the constituent subdivisions of the association, which are the Län- and Hundred-Societies, existing in 15 Läns. In 1903 the name of the association was changed to »Sveriges Landtmannaförbund» (Farmers' Association).

Agricultural meetings.

Since the Agricultural Societies had begun to work for awakening an interest in raising agriculture to a higher standard, meetings were called in several Läns, at which discussions were held on questions proposed, and, sometimes also, fine animals and new machines and tools exhibited. In 1846, the first meeting for the whole Kingdom was held in Stockholm. Since then, **General Swedish agricultural meetings** (Allmänna svenska landtbruksmöten) have been held every two, every three, and finally, now-a-days, every five years. At the meeting of 1850, money prizes were distributed for the first time. To the nineteenth meeting,

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held in 1901 at Gefle, were sent, among other things, 528 horses, 962 head of cattle, 2,900 products and expedients of agriculture and its by-trades, and 691 machines and tools. At this meeting, 72,639 kronor were distributed as prizes, and the expenditure for the meeting was 339,270 kronor, of which the State contributed with 109,500 kronor. — Besides this, meetings are called at certain intervals, and shows are arranged *within the Läns*; also smaller meetings are held within the subdivisions of the Agricultural Societies.

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5. AGRICULTURAL LABOURERS.

The assistants of agriculturists in Sweden are of four different classes: *a*) Servants, i. e. unmarried hands (men and women) boarding and lodging with their employers; *b*) Tenement-labourers, married, with homes apart, and with wages paid partly in money, partly in kind; *c*) Crofters, who rent for themselves small parcels of land belonging to their employers on the condition of rendering a certain number of days' work on the estate; finally *d*) Day-labourers, who are engaged for shorter periods on day-wages, more especially during harvest-time.

A) From the beginning, and for thousands of years, **Servants** have formed the most immediate and constant assistants in agricultural work.

As late as up to the decade of 1841/50 the greater part of the country-homes of Sweden annually lodged, fed, and partly clad (at the employer's expense) just as many servants of both sexes as the kitchen of the house could hold at the five daily meals. Money-wages were low, scarcely one-third of what they now are; the food was coarse but plentiful; the clothes of the homeliest kind, but strong; but little occasion for extra expenses, in consequence of which money could even be put by. Change of servants was far from being so common as it is now. Quitting service was mostly a consequence of serious differences, some wrong-doing, or else marriage. Those servants who remained unmarried very often grew gray in service.

During the last sixty years, all this has been completely changed. Mistresses do not care to board and lodge a single man-servant, and no more women-servants than are rendered necessary by the cooking and house-cleaning, while the maid-servant declines to do any other kind of work. The management of the cow-house has everywhere come into the hands of man-servants. It is only exceptionally that any of these men board and lodge with the employer. Unmarried labourers lodging with the farmer, are nowadays found almost exclusively on old-fashioned farms, or still within the household of the crofter, and then often engaged for but the half-year, from spring to winter. The official census confirms a continuous decline in the number of household servants engaged in Swedish agriculture: between 1880 and 1890, for example, from 216,000 to 159,000, or of 26·4 %. The loss of 57,000 such servants amounts, however, to 18,240,000 days of work annually. For, including some work on holidays, such a hand has about 320 work-days per year.

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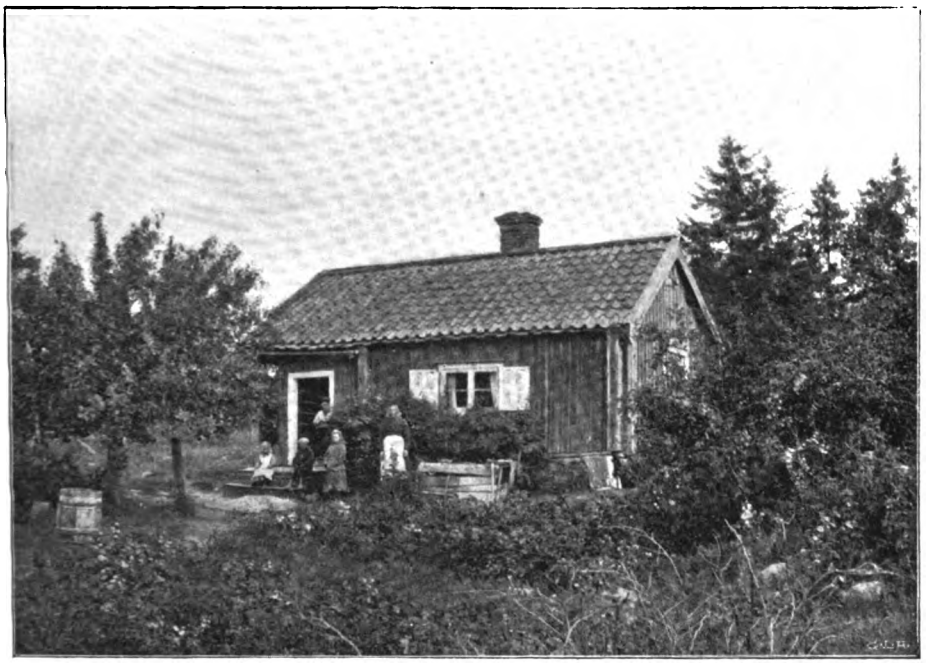
B) **Tenement-labourers** (Statare) are a kind of servants who, as a rule, are married, and who do not board and lodge with their employer, but receive, besides earnest-money, yearly wages, dwelling-room, and firing, a certain amount »in kind» (Stat), as it is called, i. e. of grain, root-crops, and milk: to these were formerly added comestibles, etc., the monetary value of which, however, is now usually added to the yearly wages.



Crofter's Cottage.

It is usually the husband who in this case is the hired labourer, and hardly ever the wife. (Unmarried women are, however, in some cases employed as tenement-labourers). But, where it can be done, the owner of the estate very willingly pays certain day-wages for a small number of days' labour, both to the wife and to those of the children who are big enough to work. But nowadays, the wife of the tenement-labourer partakes less and less in the work. Even the milking, which was the last thing required of her, now year by year becomes more and more the work of the men.

The statistics respecting the number of tenement-labourers are defective, but it is at any rate rapidly increasing. An estimate makes the present figures to exceed rather than to fall short of 40,000. About the year 1825, they were estimated as being only about 9,000.

C) **Crofters** (Torpare) — together with the members of their own households — make up the group of agricultural labourers next in importance to the servants. The crofter is, in Sweden, a kind of tenant of smaller, cultivated plots of land (torp) provided with premises, with the contract obligation of performing days' labour on the mother-estate.

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This mother-estate should be able to count upon an annual average of 150 such days' labour per holding. It seems as if the whole number of crofters, which in the middle of the century stood at about 100,000, and in 1880 at about 90,000, in 1890 was in round numbers 80,000. Thus, during the last mentioned decade, there has been a loss of 10,000 crofters or about $1^1/_2$ million days' labour.

Respecting this decrease, it is to be noted that in a number of places, in holdings in forest districts possessing both cheap ground and timber, the number of crofters will, without doubt, formerly have been disproportionately large compared to the extent of the farming of the mother-estate, in consequence of which a decline has good reason to account for this state of things. But in many cases the decline in the employment of the crofter-system certainly implies a pure loss to Swedish agriculture. What this system can effect is especially to be seen in Småland, where the crofter-system is still in a wonderful state of development. Here, the land cultivated is annually enlarged upon every croft, in a way which excites the astonishment of the beholder. The gain is evident, not only for the mother-estate but for the crofter himself, too.

A position something between the crofter proper and the tenement-labourer is held by the so-called *Labourer crofter* (Dagsverkstorpare). This last-named class is also paid by means of small plots of ground, which, however, are so small that they alone do not afford a livelihood, in consequence of which the labourer-crofter must receive from the estate a certain yearly supply of fodder and cereals. These crofters execute day's-labour when so required, for wages determined once for all.

D) There exist no satisfactory figures concerning the number of **Day-labourers.** A lot of them have their own houses and lease a piece of land; they often carry on some handicraft during a great part of the year. When the farmers are very busy, these labourers hire themselves out for day-wages, or are paid for farm-work by the job or the piece.

Considerable help for the *lesser* farmers, who themselves put their hand to the plough, was afforded, especially in former times, by the **grown-up children and the sons-in-law who were at home.** Still at the census of 1890, there were entered 127,000 such sons and sons-in-law, as well as 112,000 daughters and 9,500 daughters-in-law at home, whose work, in most cases at least, consisted in assisting the father of the family in his work. In former times and under more patriarchal conditions, this formed, of course, a very cheap kind of labour, when cash payment could scarcely have come into question. In our days, pretentions are of course greater, and in a constantly increasing number of cases the son or daughter withdraws from this subordinate position by leaving home and taking up other occupations.

It is undoubtedly shown by the preceding account that the amount of human help in farming has *diminished* of late years, a condition of things which is also testified to by the decline in the number of the total agricultural population which is shown by Table 55, page 498. This decline is partly a consequence of the increased use of machine-power, but it also partly testifies to a decline below the real needs of

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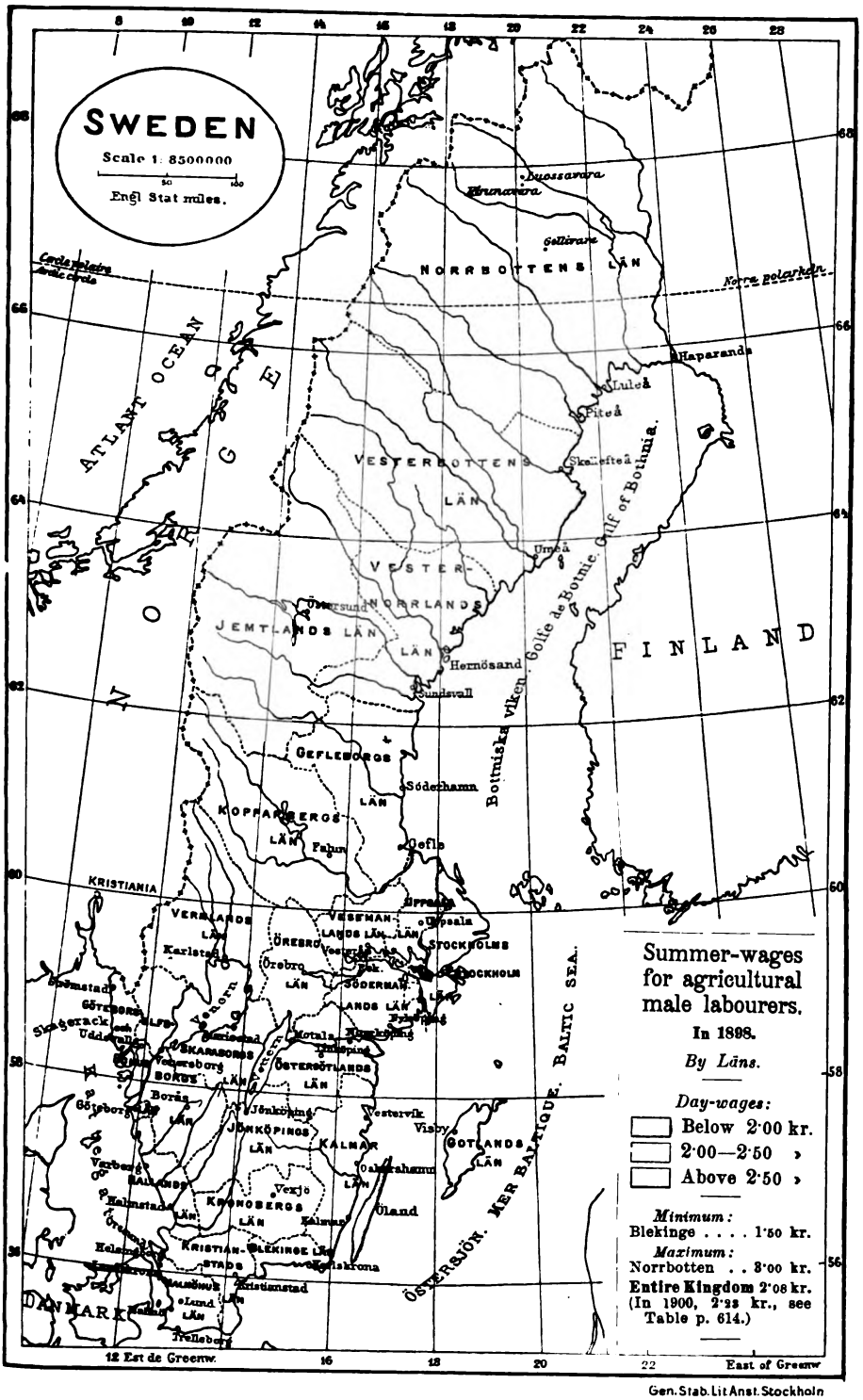

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TABLE 84. *Farming wages.* In kronor à 1·10 shill. or 0·268 dollar.

Average for the years	Yearly salary, besides room and board, for		Value of entire pay (wages and provisions).		Summer-wages per day for		Winter-wages per day for		For 300 work-days.*	
	Male servant.	Female servant.	Tenement-labourer.	Id. female.	Man.	Woman.	Man.	Woman.	Man.	Woman.
1866/70..	103	46	280	175	1·15	0·62	0·75	0·42	285	156
1871/75..	154	61	375	214	1·82	0·86	1·20	0·60	453	219
1876/80..	153	64	378	221	1·62	0·88	1·10	0·58	408	212
1881/85..	153	66	366	213	1·55	0·88	1·04	0·57	389	210
1886/90..	149	69	366	209	1·58	0·91	1·04	0·61	393	228
1891/95..	173	84	404	225	1·78	1·02	1·21	0·71	449	260
1896 00..	205	103	456	253	2·05	1·15	1·42	0·81	520	294
In 1900..	228	114	496	276	2·28	1·28	1·58	0 90	572	320

the case, in consequence of which complaints of a want of agricultural hands have made themselves heard in all directions. The explanation of the matter is naturally to be found in the immigration of the country population to the towns, and also by the emigration abroad. But another important cause is also that, as has been shown in the first part of this work, the able-bodied part of the population is nowadays unusually small, relatively speaking, in our land — from causes, too, which are independent of emigration. But as these last-named causes are, however, occasional and temporary, the want of agricultural hands which is complained of, will probably be remedied by degrees — at least as far as the economical development of the work can keep pace with the increased demands in the question of wages.

A detailed examination of the **conditions of life** among agricultural labourers was made some years ago by Captain U. VON FEILITZEN, at the expense of the Lorén Foundation. The examination, which embraced different country-districts in Östergötland, Småland, and Skåne, has given, as its chief result, the figures in the following Table.

TABLE 85. *Economic condition of agricultural labourers.*

Groups.	Total number of cases investigated.				Per cent.			
	Well to-do.	Pretty well to-do.	Poor.	Total.	Well to-do.	Pretty well to-do.	Poor.	Total.
Craftsmen	1,288	1,040	294	2,622	49·1	39·7	11·2	100
Crofters.....	5,769	7,018	3,907	16,694	34·6	42·0	23·4	100
Labourer crofters	218	639	431	1,288	16·9	49·6	33·5	100
Tenement-labourers ..	281	1,292	841	2,414	11·7	53·5	34·8	100
Day-labourers.....	456	797	489	1,742	26·2	45·8	28·0	100
Total	8,012	10,786	5,962	24,769	32·3	43·6	24·1	100

* According to previously given day-wages in summer and winter, counting 150 of either.

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By »craftsmen» is here meant under-stewards, gardeners, coachmen, cow-house foremen, farm-joiners, smiths, etc., who usually go through a professional course before they take service. — As may be seen above, the tenement-labourers are comparatively the least favoured. Those placed in the best circumstances, again, apart from the craftsmen, are the crofters, a fact which naturally shows that the crofter-system is the best way of paying the agricultural labourers. To render possible a future development of this system, new legislation is required, however, which shall render the crofter more secure than hitherto in the enjoyment of the fruits of the labour which he expends upon the improvement of his little plot of ground.

Annual reports are found respecting the **wages** of the agricultural labourers of our country — pretty rough figures, though, — in the official statistics of agriculture. A view of these figures is given in Table 84. A considerable increase may thus be seen to have taken place of late years — characteristically enough, somewhat greater in the case of the women than in that of the men. — The map on page 613 shows the varying wages paid for agricultural labour in different parts of the country. We find that the highest wages are in general paid in Northern Sweden as well as in the island of Gotland and in Skåne.

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6. AGRICULTURAL LEGISLATION.

The origin of the Agricultural Legislation still in force may be sought in the Middle Ages. All the land in Sweden was not, however, equally affected by the enactments concerning it. For the lands (»Frälse») which had come to be exempted from certain taxes, and which still up to April 6, 1810, could only be owned by the Nobility, were but to a very small extent affected by them. It was other private lands and also crown farms that this legislation, collected in the Building code of the Law of 1734, especially concerned. As long ago, however, as 1789, by a decree of Gustavus III, issued on February 21 of that year, it was declared that land-owners who were not of the Nobility had the same rights over their farms as the Nobility over theirs; and herewith a great part of the agricultural legislation which till then had been in force with regard to that land, ceased to be applicable to it.

The ordinance regulating the manner in which a village shall be established is very ancient; it may still be said to remain in force, although in our days the applicable cases are very few. The site for the village was first to be settled; greater shares in the village entitled to larger building plots; and the plots should be arranged east and west, north and south. In the distribution of the land of the village it was not the position in regard to the plots that decided the question, but especially that everyone got his parcel as well in the better as in the worse. Plots were to be built upon with farmhouses and barns and any other buildings that might be considered necessary, but in other respects everyone was allowed to build more and larger houses if he so needed. Roads and ditches for

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drainage were to be taken from undistributed land; and if any one wished, within the limits of the village, to fence round his private land, it should be his own affair, provided only that others did not suffer damage from his doing so. Where one village met another, the obligation of fencing should, moreover, be shared between them. The land which a peasant thus occupied, he should carefully till and manure, the meadows he should clear and keep in condition, and other land he should bring under cultivation, as far as he could do so without harm to forests or pasture-land — all under penalty of fine. Forests and pasture-lands were in general common to all the villagers, who might use them as much as they needed, for grazing, firewood, or timber, turf, or other things, but not for sale nor for use outside the limits of the village.

Amongst other details contained in the Building code, and which have now for the most part lost their importance, we must not, however, omit to speak of the enactments about burning woodland, which are interesting, not only from a juridical point of view, but also from that of cultural history. In the extensive tracts of country where the inhabitants were still few and forest-land ample, the peasants were wont, without regard to future cultivation, to burn the woodland, that is to allow fire to pass over a tract of forest, so as to be able afterwards during two or three years to sow rye in the ashes. As, however, such a burning of woodland rendered the tract of forest for a very long time unproductive, both as regards the growth of wood and partly also for pasturage, it was decreed that for such burning of woodland permission must be asked both of the co-proprietors in the village and of some public authorities.

As now it was sought, in this and other ways, to fix by law the duties of the peasant, it was necessary also to arrange for some control to ensure the observance of the ordinances. This was to be obtained by an inspection, a charge to be exercised by a crown officer and two jurates. On crown farms an inspection should be held every third year; on private lands, not owned by the nobility, »when neglect or faulty building thereon was noticed» (till February 21, 1789; see above). Everything should then be investigated, the buildings, within and without, fences and ditches, homefarm and forests — and what was then found wanting should be made good, and possibly even a fine be paid for it.

The agricultural legislation which has been added after 1734, and which ought to be considered in connection with this subject, is very scanty. It is, in fact, almost entirely contained in the Royal Decrees of December 21, 1857, concerning the duty of fencing property, and of June 20, 1879, concerning ditching, etc. In the *decree about fencing*, the principle was laid down that everyone is bound to look after his cattle that they do no damage. The principle in regard to the duty of fencing then requires further that when fencing is to be done between the lands of two neighbours, the two shall share the expense, etc., equally between them. Only those, however, have a right, with inconsiderable exceptions, to insist on participation in fencing, whose forests or outlying ground adjoin home-farms or other land of like character. The fence which is thus put up shall be kept in the condition in which it is first constructed, and in general be kept in the condition required by law, from May 15 till frost has entered into the soil.

As to *ditching* and the possibilities of draining boggy land, these have received a more modern form of expression by the ordinance of 1879. In the law of 1734 it was only prescribed that the villagers should, each according to his share in the village, keep up the drainage; and that each for his field should, if necessary, dig 40 fathoms of ditches or clear out 80 fathoms of old ditches. It was, in addition, prescribed that if the ditches of one village met those of another, each village should dig through its own ground, and that if anyone in digging ditches through his ground or meadow-land came to the meadow-land, pasture-land, or other outlying ground of another village, the said village might not

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prevent the outflow of the water. If a ditch should be necessary to furnish an outlet, and if the neighbours could not agree as to who should keep this ditch in condition, the judge should decide the question according to what seemed best or necessary. In the ordinance of 1879 a new principle was introduced, viz., that if any one for the cultivation and drainage of his land wanted to ditch to a depth of 4 feet, he shall not be hindered from doing so by the owners of land lying lower down. On the contrary, the owners of land which is benefited by this drainage shall, in proportion to the benefit derived, share in the cost of the draining, including a compensation for the ground which is used in digging the ditch, penetrating, etc. It is also prescribed that drainage shall not be prevented from running out into a neighbour's already existing ditch, but that the cost of the possible alteration of the latter, necessitated by the new influx, and that of keeping the ditch in order, shall be met in the same way as prescribed in the opening of a new ditch.

Much the same principles and prescriptions hold good in the question of *lowering the level of a lake* or of tapping a lake; but public approval through the Governor of the Län is in this case required. Anyone, however, who in such a matter of drawing off water is not himself a petitioner and does not concur in the petition, can have exemption from sharing in the cost of the undertaking if he, within a year after the execution of it, renounces before the Governor the benefit thereof. The expense incurred on account of his land shall be met by cutting off from the improved land as much as corresponds to the value of the improvement to him and adding it to that of the sharers in the enterprise.

Tenant Legislation.

The Tenant Legislation has the same origin as the Agricultural Legislation. Prescriptions still in force and collected together in the law of 1734 can in almost all their essentials, be traced, not only in the laws of the realm laid down during the latter part of the Middle Ages, but also in different provincial laws. There was consequently nothing new that the law of 1734 introduced into our code. All the more worthy of note is then that, however much the agricultural conditions were changed during the time elapsed since 1734, the tenant legislation itself did not undergo any essential alteration. If, however, any change in its conditions is to be noticed, this depends upon an altered way of viewing things, and not least that the relations between lessors and tenants, which still as late as 1734 were relations as between master and dependent, have now become, if we except the crofter-system (see p. 611), an entirely economical relation between two contracting parties on the same footing.

No fixed form is prescribed for the agreement whereby one person lets to another land for cultivation; so it can be either a verbal agreement or a written one, with or without witnesses. To ensure safety, however, as against a third person, the tenant is required to obtain registration, and this is granted by the court only on the ground of a contract drawn up in writing and attested by witnesses. The duration of the agreement may be either fixed or dependent on the giving of notice.

A fixed period may not extend over more than fifty years — in the case of a lumber lease, only twenty years — and at the expiration of the time the lease shall terminate without previous notice being given. If the agreement be made on the

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condition of notice given, the lease shall expire when the legal year of surrender, reckoned from the time for giving notice, has elapsed; i. e. the year of surrender is not reckoned to begin to run before December 21, if notice have been given before that date, and lasts all through the following year and till March 14 of the year following thereupon. The 14th of March is in all agricultural property — except ecclesiastical benefices, where it is the 1st of May — the legal day for outgoing and taking possession. The 21st of December is the legal pay-day, when the tenant, if nothing be otherwise stipulated in the lease, shall pay his rent. If this rent be payable in money, it shall be tendered to the landlord at his residence; if in prestations in kind, these shall be held for him at the place of the leased property.

The tenant has the right to cultivate and use the arable land, meadows, forests, buildings, etc. of the property as they exist there, if there be no exception contained in the lease. All these the tenant shall keep during his tenancy in the condition in which he received them, shall even, according to the wording of the law, improve the property by new buildings and new cultivation — a prescription which has now, however, largely lost its importance. The forests of the property may be used in proportion to their produce as far as necessity requires and to supply what is needed for daily use, i. e. that if the production be small the tenant must certainly obtain forest produce elsewhere for the supply of the daily needs of the farm.

Hay and straw produced on the farm and the manure dropped must be used on the farm, on pain of forfeiture of the right of tenancy.

Before the property is delivered up, a waste inspection shall be held by two jurors, to investigate matters and ascertain in what condition the property is left. The inspection shall embrace the houses, without and within, the fences, ditches, tillage of the soil, pasture-land, and forests, or as much of these as is decided by agreement between the two contracting parties. What is thus shown to be lacking shall be noted and appraised; if at the expiry of the lease the waste be greater than it was at its commencement, the overplus is to be indemnified by the tenant. In the opposite case again, if at the expiry of the lease the waste be less than at its commencement, the tenant is not considered to have a right to compensation — according to the principle which refuses to the tenant a right to compensation for improvements carried out on the property.

Some new principles in regard to the conditions of tenancy in Sweden have been introduced by the Royal ordinance of November 10, 1882, concerning the administration of *crown domains*. In this proclamation it is ordained that the obligation of the tenant in regard to rebuilding may not exceed $^1/_{10}$ of the annual rent; that fodder may, with the consent of the Crown Land office and on conditions prescribed by it, be removed from the farm; that the tenant is entitled to compensation for any considerable work for various kinds of drainage of the land, for cultivation of virgin soil, when it is proved that the cost has been greater than the profit the tenant could derive from it during his tenancy; that the tenant shall be entitled to compensation for fallow circulation, etc., and for straw and fodder which he may leave at the expiration of his lease. These decisions, it is true, do not apply to other than crown-tenants; but they unmistakably indicate the direction in which future tenant legislation is going to develop.

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VII.

FORESTRY.

1. THE FORESTS.

Of the 41 million hectares (101 million acres) which Sweden occupies, inland seas not included, 21 million hectares (52 million acres) are at present considered to be covered with wood; consequently fully 50 per cent., or more than half. Of all the countries in Europe only Finland seems to have a somewhat greater part of the ground wooded than Sweden. The average figure for the entire Europe is 33 per cent, but for West Europe only 25 per cent.

For each hundred of its inhabitants Europe has on an average about 80 hectares of wood. West Europe has only 40; the figure for Sweden is fully 400. Also in this case Sweden's figure is the highest in Europe next to Finland's. A comparison between Sweden and some other countries from this point of view is given in the diagram on page 620.

How Sweden's ground is divided between common and private property can not be stated, as no estimation has ever been made concerning the area of field and meadow which belong to the Crown-domains, and partly not even of the outfields. As to the **outfields**, that is the whole land-area counting off the arable land and natural meadows, an approximate partition can still be made, which for 1900 turns out in the following way, in hectares[1]:

	Below the line of coniferous plants.	Above the line of coniferous plants.	Total.
Belonging to the State[2]	7,071,010	6,675,224	13,746,234
» » hundreds & parishes	640,477	—	640,477
» » private persons	21,714,731	—	21,714,731
Total	**29,426,218**	**6,675,224**	**36,101,442**

These figures, however, are not very reliable (see note to the Table), and can only give an approximate idea of the case. In the figures for the public forests the unreclaimable land (not wooded) may as a rule have been counted in, still not always.

[1] An hectare = 2·47 acres. — [2] Under this head are included also the woods of ecclesiastical benefices and public institutions, part of which do not belong to the State.

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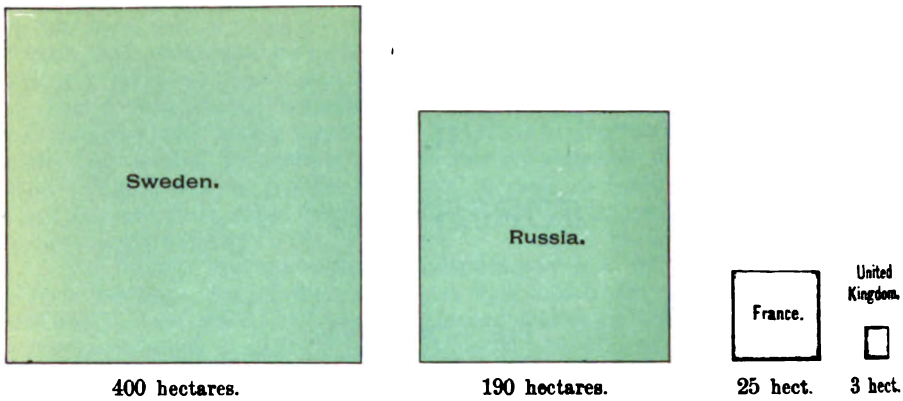
Wooded ground, in hectares, per 100 inhabitants.



It will be seen from the previous Table that the whole big territory in the N. W. of Sweden situated above the coniferous limit, is considered to belong to the State. Including this territory, 38·1 per cent of all outfields in Sweden should be State property, 1·8 per cent belong to hundreds or parishes, and 60·1 per cent should be private property. Of the territory, on the other hand, which is situated below the limit of coniferous plants, 24·0 per cent is the property of the State, 2·2 per cent other public property, and 73·8 per cent private property.

Of the whole outfield — 36,101,442 hectares — 15,394,325 hectares are not wooded, of which 6,675,224 hectares owing to their situation above the coniferous limit, while 8,719,101 hectares below this limit are not wooded. The **wooded ground** consequently amounts to 20,707,117 hectares. These figures still are very uncertain. Of the ground entered as wooded, not inconsiderable domains have been cut bare of wood or deprived of their wood-covering from the ravages of fire. On the other hand, the accounts concerning the extension of the wooded ground, are in many places too low, especially in Småland and in certain parts of Norrland.

The extension of forests within each one of the Läns of Sweden was calculated, in 1900, to the compass which is given in Table 61, page 521.

A presentation in diagrammatical form is given in the map, page 622. Of all the forests in the Kingdom, two thirds are situated north of the Dalelfven River. Relatively to the area, northernmost Sweden is not so rich in wood, because a great part of the country is here situated above the tree-limit. Richest in wood are the Läns of Vermland, Kopparberg, Gefleborg, and Vesternorrland, where from 60 to more than 80 per cent of the ground are wooded.

The return of the Swedish forests, or the annual growth, *capable of being used*, has been estimated to 27 million cubic meters. Concerning the **consumption**, the following calculation has been made out for 1897.

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Exported unwrought timber	6,990,000	cubic meters.
» wrought timber, except wood-pulp	100,000	» »
Wood used for wood-pulp	1,419,000	» »
Timber for mines	5,687,000	» »
Other use	15,853,000	» »
Total	**30,049,000**	cubic meters.

The present consumption consequently should exceed the growth *capable of being used* by about 3 million cubic meters annually. Still it ought to be remarked that the total growth is considerably larger than the amount of wood-material used, inasmuch as in certain places part of the wood-material worth felling cannot be utilized but has to be left to moulder in the woods. Thus, in the Läns of Norrbotten and Vesterbotten no less than 40 per cent are considered to be wasted, in the remaining part of Norrland as also in Dalarne about 20 per cent, and in Central and Southern Sweden 5 per cent. Increased prices of wood-material, owing to a decreasing supply and improved communications effect, however, that the wood-material in all parts of the country is better utilized, which circumstance naturally should diminish the above calculated surplus of wood-cutting. But on the other hand the consumption is steadily increasing, and it is hard to calculate when a balance is reached, so that the consumption (the quantity of wood-cutting) does not exceed the growth. The wood-production might be considerably increased if the present heaths, calculated to half a million hectares, as well as other now improductive territories, as for instance some bogs and morasses possible to drain, were put in a woodproducing state.

Public forests.

A) The history of the Swedish **State forests** shows great vicissitudes. This especially concerns the nineteenth century, just now terminated. Under the influence of the new economical ideas which at the beginning of the aforesaid century asserted themselves, namely that the State was not capable to carry on economical activity with any greater advantage, the crown-forests in the southern provinces were between 1810 and 1830 given away for the greatest part or sold at a very low price to private persons. Even in the northern Läns, at the so-called delimitation (»Afvittring»), when big territories not occupied by cultivation were distributed among the State and private persons, the interests of the State were for a long time not taken care of at all, but wood-territories were given to private farms, which territories were not at all in proportion to the value of the farms in other respects. After the general increase in value of lumber in the middle of the nineteenth century, these forests were made an object for lively speculation, and were soon transferred into other hands for cutting, often without regard to their future

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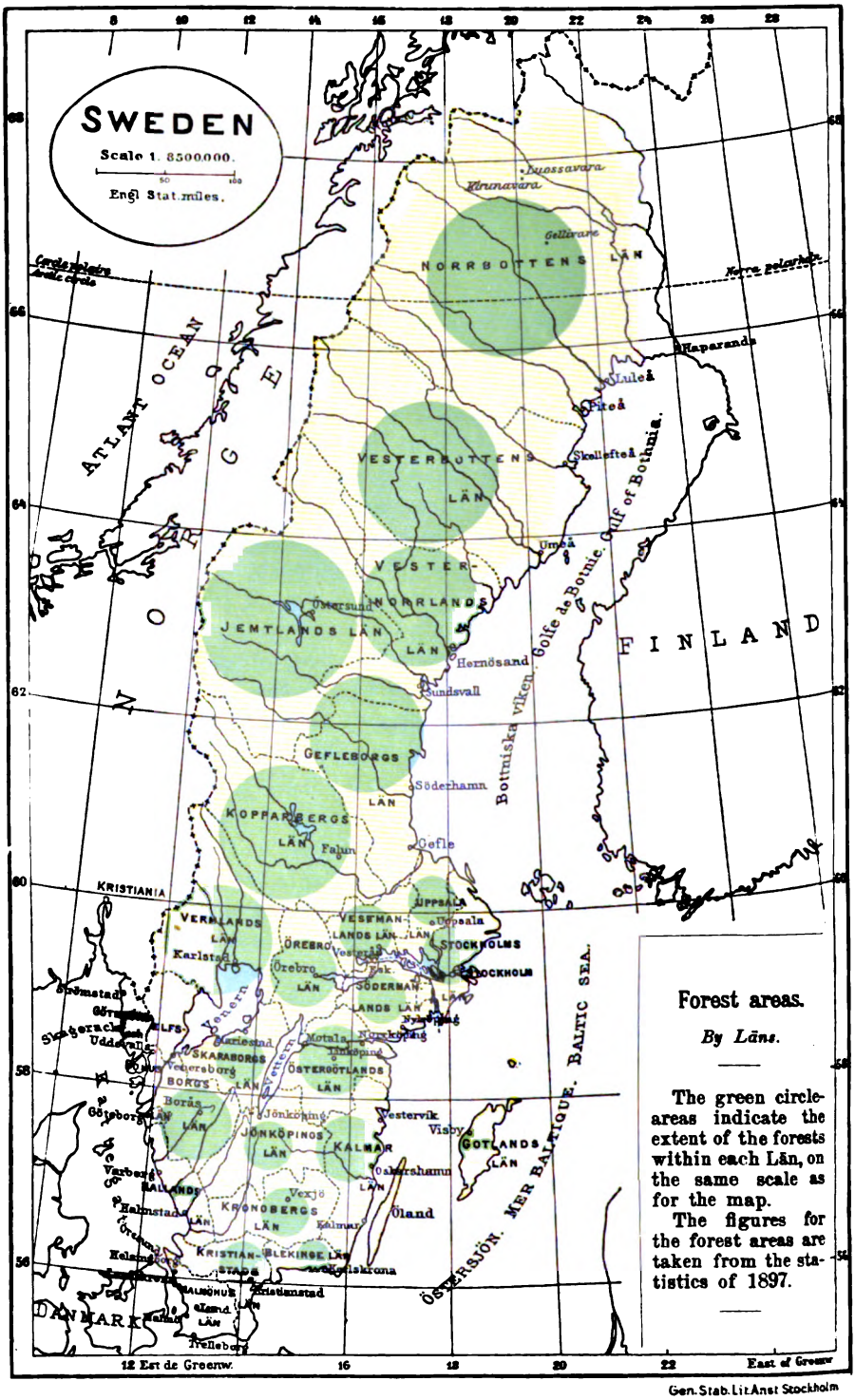

Forest areas.

By Läns.

The green circle-areas indicate the extent of the forests within each Län, on the same scale as for the map.

The figures for the forest areas are taken from the statistics of 1897.

Gen. Stab. Lit. Anst Stockholm

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existence. By this, attention was drawn to the fact that the State ought for its own part to keep, and for the future take care of its supply of forests, especially as extensive grounds in Norrland and Dalarne were still not disposed of.

From about 1860 the Swedish State accordingly has followed new principles with regard to the keeping of its wood-property, and the result is clearly evident from the fact that the area of the *Crown parks*[1] has, between 1870 and 1900, increased from 425,794 to 4,518,067 hectares.

The area, not only of the Crown parks but also of other State forests as well as public forests of other kind, at the end of the years 1880, 1890, and 1900, is shown by the following figures in hectares — as a rule including the unreclaimable (not wooded) land[4].

	In 1880.	In 1890.	In 1900.
Crown parks	2,285,277	3,408,751	4,518,067
Not organized State grounds[2]	1,161,528	1,049,249	689,085
Forests of the crown domains	252,726	240,710	171,518
Forests of civil tenures	18,807	16,920	14,056
Plantings on drift-sands	2,166	1,397	1,333
Total A	3,720,504	4,717,027	5,394,059
Forests left to mines	41,519	40,604	32,572
» left to sawmills	234,853	269,070	119,835
» of ecclesiastical benefices	306,847	342,083	348,952
» of public institutions	33,059	33,379	43,347
» of crown farms[3]	1,0778,90	1,472,907	1,132,245
Total B	1,694,168	2,158,043	1,676,951
Sum total, hectares	**5,414,672**	**6,875,070**	**7,071,110**

Under A are entered those forests which the State owns or has let, under B, on the other hand, those which have been given up for other purposes. Part of the grounds entered under B do not *belong* to the State, but still are under its control or administration. Some of the above figures for earlier dates are uncertain.

The value of the State forests entered under the first two titles above (crown parks and not organized state grounds) is estimated to about 72 million kronor. The direct *revenues* of the State from its forests have amounted to[5]:

Averages for the years	Gross revenue.	Expenditure.	Net revenue.
1871/75	916,328 kronor.	415,995 kronor.	500,333 kronor.
1876/80	1,024,643 »	685,587 »	339,056 »
1881/85	1,798,842 »	712,971 »	1,085,871 »
1886/90	2,285,172 »	829,893 »	1,455,279 »
1891/95	3,249,053 »	1,072,637 »	2,176,416 »
1896/00	6,596,997 »	1,575,732 »	5,021,265 »
In 1900	8,418,348 »	1,944,083 »	6,474,265 »

[1] Fully organized state forests. — [2] Grounds left in possession of the State after the »Delimitation» (see p. 621); here are also included districts not yet delimited but which are considered to remain State property after completed delimitation. — [3] Crown farms = farms disposed of against special dues to the State. — [4] An hectare = 2·47 acres. — [5] A krona = 1·10 shilling or 0·268 dollar.

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These figures show a considerable increase in the State revenues from the forests — an increase which for the last few years partly depends also on the exceptionally favourable conjunctures in the world's market.

Concerning the above mentioned different kinds of public forests, we may give some short guiding data. Like questions of exchequer in general, this subject would properly require a rather explicit account to be fully comprehensible to foreign readers; on account of limited space, only short indications can naturally here be given.

The Crown parks. As mentioned above, their area has during the last three decades been more than tenfolded. This increase is still going on, partly because a great deal of Crown land remaining after the »Delimitation» (see p. 621) is transferred to the Crown parks, partly because the forests left by the State to the disposal of saw-mills and mines return to the Crown, partly through purchases of forests, partly and finally because forests of the Crown domains are organized as Crown parks.

The purchases of ground by the State for creating or enlarging Crown parks, has since 1875 been of the following extent[1]:

Years.	Area.	Purchase money.	Per hectare.
1875....	1,876·09 hectares.	51,634·00 kronor.	28 kr.
1876/80.....	11,368·20 »	778,558·98 »	68 »
1881/85.....	952·60 »	100,487·86 »	105 »
1886/90.....	44,660·69 »	1,353,823·70 »	30 »
1891/95.....	46,995·72 »	2,530,689·42 »	50 »
1896/00.....	135,769·33 »	7,953,416·26 »	59 »
Total	**241,622·63** hectares.	**12,768,609·72** kronor.	**53** kr.

These purchases of ground have principally been made in the southern parts of the country.

The area of **Not organized remaining State ground,** inclusive of Crown land not yet delimited (see p. 623, note 2), amounted at the end of 1900 to 689,085 hectares. These forests are being reduced, principally because certain grounds are gradually transferred to Crown parks.

Forests belonging to the **Crown domains** let on lease have a total area of 171,518 hectares. The area of these forests is also decreasing, partly through the sale of smaller farms, and partly because certain forests become reserved for Crown parks.

The forests of civil tenures generally belong to the residences of bailiffs and constables and have an area of 14,056 hectares, which is still somewhat diminishing through the drawing in of the residences, which are then let or sold.

The drift-sand plantations of the State, situated within the Läns of Blekinge, Kristianstad, and Halland, comprise 1,333 hectares.

Forests, mostly belonging to the State and under its administration, and which have been given up to various other purposes, are in the tabular summary on page 623 entered under the title B. Under this head come the different kinds of forests mentioned below.

[1] An hectare = 2·47 acres. A krona = 1·10 shilling or 0·268 dollar.

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From Nordingrå in Ångermanland.

The **State forests left to mines** for the support of the mining industry comprise 32,572 hectares. Part of these have been withdrawn by the State, since the conditions for giving them up to private persons are no more at hand.

The area of **State forests left to be cut for saw-mills** amounts to 119,835 hectares. During the close of the eighteenth century and the earlier half of the nineteenth, the State tried to support the saw-mill industry in Norrland by guaranteeing to certain saw-mills a felling-survey from the crown-forests of a larger or smaller number of trees at a fixed price. To the saw-mills thus privileged was soon given the right to have ground set apart — the »Stockfångst»-forests — for the cutting of timber. It proved, however, later on that these forest-domains given to the saw-mills had the power to yield considerably larger wood-quantities than the annual privileged amount of timber or trees, at the same time as difficulties arose about deciding on the disposal of this overplus. Owing to this, as also to other causes, an agreement has during the last few years been made between the State and several privilege-holders, on account of which these latter — against the right of utilizing during some few years all the trees in those forests, up to a certain dimension lower than that decided before — have undertaken to restore the forests in question to the State at the termination of the lumber time and give up all further claims.

The area of the forest and pasture ground belonging to the **Ecclesiastical benefices** amounts to 348,952 hectares. The return is disposed of, in the first place, for the supply of the residence-holder and for the wood-supply of the parish when building a rectory and, although with certain restrictions, in building a church. The rest of the ordinary wood-production is, as a rule, divided between the minister and the general »Regulating Fund of wages for the clergy», while the income for such extra wood-production (through cutting for the purpose of improving and clearing) as not required for just mentioned supply, goes to the »Forest-fund of the clergy benefices», by which the expenses are defrayed for forest districting and forest plantation at clergy benefices with insufficient wood-revenue to supply means for those purposes. — At clergy benefices bought by

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the parish or given as a donation by private persons, the wood-production is assigned to the benefit of the holder and to the parish, according to the special resolution of the Government and the wording of the donation-letter.

The area of forests belonging to **Public institutions**, such as churches, academies, hospitals, etc., amounts to 43,347 hectares.

The Crown farm and settlement forests. Their return goes to the tenant. The total area amounts to 1,132,245 hectares.

B) The total area of the **Forests of the hundreds** (the commons) amounts to about 100,000 hectares. Shareholders in the forests of a hundred are the farmers in the hundred, according to the size of their farms. But the forests of the hundreds are not to be divided but must be kept undiminished and treated according to such economic principles founded on a scientific basis, as purpose the future existence and highest return of the forest. If a common of a hundred has not been placed under the administration and care of the Forest-service, nevertheless the State foresters shall control that the economic principle decreed for the common of the hundred be followed. The return of the common of a hundred is in the first place used for meeting the expenses of its guarding and management, secondly for building purposes of the hundred, and lastly for distribution among the shareholders.

C) The **Parish forests** amount altogether to about 540,000 hectares. The parish forests (the parish commons) in the *Län of Norrbotten* stand under the care and management of the forest service. They are constituted by the land-owners of the parish having decided at »the Delimitation» (see p. 201) to reserve part of their forest grant to forest in common. The area of these forests amounts to 279,820 hectares. The parish forests in the Läns of *Gefleborg* and *Kopparberg* have arisen by a bigger area of wood granted in certain parishes at the »General re-parceling of land» (see p. 512) under the condition that forests in common should be formed thereof. The area of these forests amounts to 257,053 hectares. The valid prescriptions as to their attention and care only in some measure limit the shareholders' free power of disposal, wherefore the forests may easily have been too hardly used. Out of the returns of the forests considerable Funds have nevertheless been formed, which are used for the wants of the parishes. (See the chapter on the finances of the communities, p. 253).

Administration of the public forests.

Most of the public forests, even those which do not belong to the State, are under the administration or control of the *Forest service*, which besides administers the State's landed properties. For nearly all of these forests the rule holds good that the economy should be enduring. These two factors, professional information and the custom of continuity, account for the general excellent management conferred especially on that group of public forests which are under the direct

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administration of the Forest service. This administration nowadays includes (as before shown) Crown parks, driftsand plantations, mine forests, and many commons, forests attached to residences, and the Crown farm forests let on lease. And in connection with the new general forest legislation of 1903 (see below), special laws, in force from 1905, have been promulgated concerning the forests belonging to towns and public institutions, providing that these forests are to be placed under the control of the Forest service. The question of putting all commons under the administration of the Forest service is, however, not yet settled.

Forest Legislation in Sweden was first concerned with the regulation of *public* forests. Mention is made of *commons* in the earliest existing legal contracts and charters. Under that designation were included those stretches of wooded land that intervened between the tracts of cultivated country; these intervening stretches were considered by the owners of the adjacent land as necessary, both for yielding them forest produce and for allowing them an opportunity to extend the cultivated land in their possession.

Hence these wooded tracts could not be appropriated by any one who chose, as was the case with waste land. Sometimes, however, the name commons is found applied to these waste lands, which by degrees came to be regarded as State property. In the proclamation of Gustavus Vasa, of April 20, 1542, it is declared that »uncultivated tracts of land belong to God, the King, and the Swedish Crown». These tracts were not, however, dealt with exclusively as property of the State; they were, on the contrary, held in readiness for the furtherance of land-culture, on the one hand by apportionment of land for colonization by settlers (in Norrland), and on the other by the grant of the right »to such cultivators of the soil as do not enjoy it in woods of their own, to make use of pasture, timber, fencing-material, leaves for fodder, birch-bark, peat and bast, besides other things to be found there, to supply their own bare needs.» This enactment gradually produced the impression in the minds of the people, that these commons were public forest-land, belonging in some cases to parishes, in others to hundreds. Those that belonged to the parishes have with few exceptions been divided between the shareholders, while those belonging to the hundreds remained intact and under the control of the State. In some instances the tracts were retained as State property and were transferred to Crown parks, after explications having been made concerning their nature.

The Swedish **Forest Service** originates from a *Venery service* instituted already in the 16th century. Earlier mentioned »deer and bird-shots» and »rangers and deerkeepers» did not form a body collected. The principal work of the Venery service was till the beginning of the nineteenth century also connected with shooting, although already in the middle of the seventeenth century attention seems to have been paid to forestry. On behalf of *forestry* the Venery service still did not do very much, until, after the institution of the Forest Institute in 1828, the officials were given opportunity to gather special information in forestry. After the institution of a Forest Board, in 1859, the chief of that also became chief of the Forest- and Venery service.

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With a view of bringing together under one central office the direction of the administration, not only of the forests but also of the State's landed properties, the Forest Board was in 1883 re-organized into the **Crown Lands' Office** now existing, the chief of which thus is chief of the Forest service. The mission of this service is in the first place the care and management of the public forests. The care and improvement of game has become of smaller importance, but still it is included among the duties of the Forest service.

After the last regulations, which came in force with the beginning of 1901 and 1903, the Forest service consists of 9 *chief masters of forest* and 89 regular *masters of forest*. According to the same regulation, the number of regular *rangers* was raised to 348. — The service territories of the forest service are termed *districts* for chief masters of forest, »*revirs*» for masters of forest, and *sections of guarding* for rangers.

In the districts *assistants* are employed for assistance principally in the office of chief masters of forest, and *extra masters of forest* for temporary forest work. On larger revirs *assistant masters of forest* are appointed, who administer a certain part of the revir on their own responsibility. To the assistance of masters of forest *sub-clerks* are appointed on the revirs. The total number of auxiliary officials in the forest service amounts to about 150, of which nearly half at the same time had private employment.

In addition to the above mentioned officials, there are 6 *forest-engineers* employed in the Forest service. They are tasked with the execution of forest transactions for private owners, after request at the Crown Lands' Office. The forest-engineers are paid by the Government but also receive pay from the private forest-owners who have demanded their services. The work of the forest-engineers consists of forest partition, revisions of earlier economic projects, afforestation, drainage of boggy woodland, arrangements for thinning and other things for the care and improvement of the forest, information in forest economy at agricultural schools, etc. The interest of the public for the activity of those officials has shown itself to be greatest in Central Sweden, least in the relatively more woody northern parts of the country.

Private forests.

By far the preponderant part of Sweden's forests, with the unreclaimable land about 22 million hectares, or half the area of Sweden, belongs, as above shown, to private owners, and the private forestry is consequently a question of the utmost importance for the country. Leaving aside the *northernmost part* of the country, for which one has been compelled to limit the disposal of private forests by *special laws* (see below), a survey of the state of the private forests gives the following result. It is to be observed that the public forests in the parts of the country mentioned below have a relatively limited extension, or about 6 per cent of the forest-area (against about 45 per cent in the northernmost Läns), owing to which circumstance the *private* forests in here mentioned parts cast the balance for the general state of the forests.

With regard to the state of the forests south of the Läns of Norrbotten and Vesterbotten, the three following regions can be distinguished:

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a) *Central and Southern Norrland and Dalarne* are of greater importance for the timber export of the country than the whole remaining Kingdom. Over-lumbering of large timber is considered to be general and also of small timber in the coast-regions. Several, particularly larger forest-owners within the region, however manage their forests very well.

b) *The mining-district* comprises a belt from the Län of Vermland to the Län of Stockholm, or that part of the country where the mining industry is specially carried on. The forests are full of growing-power but over-lumbered, which nuisance has increased since the saw-mill industry has become general here also. The rejuvenescence of the forest after felling for coaling is good, and the forests of the iron-works are generally well managed.

c) The forests of the country *south of* the aforesaid belt do not any longer give rise to any big industry. The timber export, which compared with the wood-supply is quite considerable, includes a relatively great percentage of small timber, as pit-props, rafters, etc. Most of the farm-forests, especially the smaller, usually resemble badly managed pasture-grounds, where birch, aspen, alder, and other leaf-trees form a great part of the sparse vegetation. To favour the pasture, the woods are usually kept thin; the want of pasture-ground for cattle also counteracts the disposition to cultivate the bare ground with wood. Larger forest-owners, however, have exemplary forest economy in many places.

The private forests of the country are *on the whole* — though with many exceptions — in a neglected state and are, as a rule, objects for *over-lumbering*. It is true that exact statements are lacking concerning the quantity of the over-lumbering, as for its calculation precise information is required, not only concerning the annual growth of the forest, but also concerning the quantity of the annual lumbering. For want of exact statistic informations, one has to be content with the approximate estimation which has been given above on page 621.

The necessity of finding a remedy for those unfavourable conditions has during the last decades caused numerous propositions, not only by private persons but also by Royal committees with a view to regulating and promoting the conservation of these forests. As early as in the sixties and seventies, special laws were issued regarding the forests in the Läns of Gotland, Norrbotten, and Vesterbotten as well as in the northernmost part of the Län of Kopparberg (parish of Särna), concerning which see the following. A *general* law, with regard to the remaining greater part of the country, has only in very recent times been brought about, when after many debates and difficulties one has arrived at the **Legislation of 1903** concerning the management of private forests — from a principial point of view one of the most important economic laws that ever was promulgated in Sweden. We present below an abstract of its main provisions as well as a brief historical account of the development of private forest legislation in our country.

The legislation concerning these forests has in the past gone through highly remarkable phases of development. From complete freedom, three hundred years ago, they were by and by made an object of increasingly severe legislation, and finally even the lumber-felling for household-purposes was placed under the control of the State. Then followed a reversion, which at last once more led to nearly complete freedom. During the last five decades a reaction has set in, imposing

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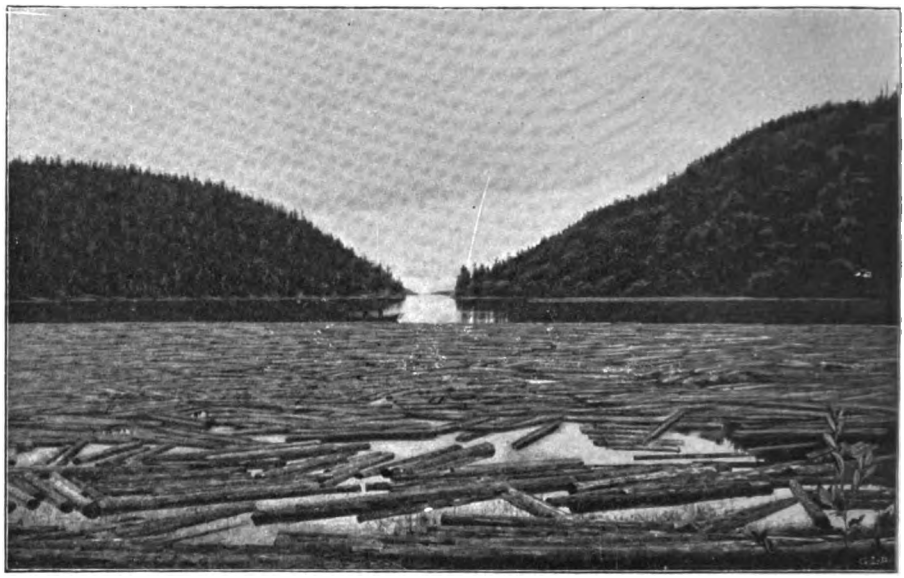

From Nordingrå in Ångermanland.

several restrictions upon private forest-owners with regard to the management of their forests.

This legislation commenced in the way that the right to establish settlements and get them converted into socage farms was connected with the condition that the forests of farms founded in this way could be freely used only for household needs, while timber intended for sale had to be looked out and marked by the proper forester before the felling. It was, however, only by the Royal ordinance of June 29, 1866, that this instruction was given for the six northern Läns. The settlement system had before been so partially encouraged, that in many places it had turned into forest speculation under the guise of land culture. And as the permission to establish settlements concerned not only »undelimited» forests, but also such areas as remained after »delimitation» (p. 201), had taken place, there was in many places but little woodland left for the State. By Royal letter of May 16, 1860, it was, therefore, ordained that an examination should be made of the said surplus areas, as to whether they could be suitably reserved for Crown forests. A Royal ordinance of December 21, 1865, ordered a similar procedure to be adopted with reference to the undelimited forests in the Län of Kopparberg and in the Norrland Läns, for the sake of increasing the area of Crown forests; by the same decree settlements were forbidden for the time being, not only on the remaining state grounds but also in the undelimited forests. When permission was subsequently, by the aforesaid Royal ordinance of June 29, 1866, again granted for settlements to be made on ground found unsuitable for Crown-parks, the above mentioned condition was attached. The farms arisen on that basis have a total acreage of nearly 200,000 hectares.

The principle that had thus established itself in Swedish forest-legislation was applied with far more thoroughness in **Lappland**, where delimitation at this period had not been introduced, inasmuch as settlers would have no other right to forests than that enjoyed by the occupants of Crown-farms. Without violation of or encroachment upon the rigths of individuals, it was ordained in § 8 of the Royal statute of May 30, 1873, concerning delimitation in the Lappish territories

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within the borders of the Läns of Vesterbotten and Norrbotten, that farm-owners in those districts should not enjoy other rights to the woods on their farms than those of taking, without previous official survey, such timber as they might require for household needs and for fuel, and of appropriating, subsequent to official surveying and marking, for the purpose of selling, such timber in addition as can be annually felled without injury to the future preservation of the forest. Also at the delimitation in the parish of **Särna** and the subparish of Idre, both in Dalarne, homesteaders were only granted a similarly restricted right of disposal of the woods falling within the bounds of their allotments, and that in accordance with their own expressed agreement. In this way a very considerable section of the forests of North Sweden has been subjected to regulations ensuring system in the working up of them. The immense importance of this will be seen more clearly when it is remembered that the locality of these forests in the immediate neighbourhood of the Scandinavian Alps renders their preservation invaluable, as a protection against over-severity of climate.

The general legislation of 1903 refers to laws for the promotion and protection of regrowth of forest. Its first paragraph decrees: »*In forests owned by private persons, lumbering must not be carried on, nor subsequent to the lumbering the ground be treated in such a way that the regrowth of wood is endangered.*» This ordinance does not, however, prevent the cultivation of wooded ground into garden, field, or meadow, nor its use for building plot or kindred purposes, or its use for pasture ground. The right to pasturing may, however, when so be necessary for the protection of regrowth, be limited to a certain time of the year. In marshy woods, where the growth and regrowth evidently are made impossible, owing to the character of the ground, the law is not applicable. If there has been mismanagement of woods, the person guilty is obliged to take the necessary measures for securing the regrowth. If the person guilty be not the owner but the holder of the right of lumbering, the former is, subsequent to the law having been put into force, responsible for the taking of the measures, still with the right for the owner to obtain reimbursement from the person guilty. Any definite regulations concerning the measures which are deemed *necessary* in this respect, have not been laid down, this being left to the person in question.

It is incumbent on *Forest Conservation Boards* to control the wood proprietors' performing their duties. There is to be such a Board in each Län where the law is applied. The members of a Board, who are to be three persons well acquainted with the forest conditions of the Län, are appointed for three years at a time, one by the Government (the chairman), one by the County Council, and one by the Managing Committee of the Agricultural Society of the Län. By the side of the Boards and their officers and overseers, the supervision with regard to the observance of the law may be excercised by *Forest Conservation Commissions*, which are formed in the communities so desiring. The Commissions consist of three persons elected for three years, one by the Forest Conservation Board, and two by the Communal Assembly (see p. 251). When mismanagement of woods has been proved, it is the immediate duty of the Board to seek to bring about necessary measures for the regrowth, through voluntary agreement with the person responsible. If such an agreement cannot be established, or if the measures stipulated are not taken, the Board has to enter on legal proceedings against the person concerned. Before judgment has been given, the Court may inflict prohibition of lumbering. Such prohibition may be recalled when pledge or caution with regard to the taking of the necessary measures be deposited. If lumbering has taken place in spite of prohibition, the person guilty is to be punished with a fine of 25—500 kronor, and the timber that has been lumbered is confiscated and judged forfeited. If the timber be no longer in the possession of the person responsible, he has to reimburse its full value.

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To cover the expenditure for carrying on the work of the Board, *export duties* are imposed on timber and wood pulp. These duties are levied with 5—10 öre per cubic meter ($1^7/_8$—$3^3/_4$ *d.* per reg. ton) of timber, for dry chemical wood-pulp with 50 öre per ton ($6^3/_4$ *d.* per ton à 2,240 *lbs*), for dry mechanical wood-pulp with 30 öre per ton (4 *d.* per Eng. ton), and for moist pulp with half the amount of that for the dry one. These duties, which are collected by the Custom officers and go to the Exchequer Department, are subsequently distributed among the Läns, according to regulations laid down by the Government.

A special law provides concerning *shelter forests* at the alpine frontier, and at drift-sand plains. — Further it may be observed that for *contracting with regard to right of lumbering*, the allowed time is reduced from 20 years to 5 years. — Finally, in connection with this new legislation, some statutes, of which is already spoken, have been issued, partly concerning the *management of forests belonging to towns*, with regard to which there have not before been any regulations, and partly as to the *management of certain public forests* (see p. 627).

The above mentioned legislation of 1903 concerning private forests does not refer to the aforesaid parish of Särna in Dalarne, nor to the Läns of Gotland, Vesterbotten, and Norrbotten, for which parts of the country two **Special laws** in this regard have long been in existence.

The Royal statute prescribing measures for the prevention of forest devastation on the island of **Gotland** dates from September 10, 1869, and received fresh confirmation by law of March 30, 1894. The statute enacts, in brief, that ground naturally fitted for the growth of timber shall be retained as forest-land, where it is not cultivated, built upon, or occupied in any similar way. It is, furthermore, forbidden to export from Gotland the timber of fir and pine, provided the trees felled do not attain a minimum diameter of 21 centimeters ($8^1/_4$ inches) at the thick end.

The law for Gotland is, thus, of a nature to fix conditions both concerning fresh growth and the dimensions of timber to be removed. The second law, on the other hand, is concerned only with the latter. This is the forest law for the **coast territory in the Läns of Vesterbotten and Norrbotten** (concerning the other, i. e. the Lappish districts of the same Läns, see p. 630). Originally enacted solely for Norrbotten in 1874, it was in 1882 extended as to include also Vesterbotten. By royal statute of March 19, 1888, the two former acts were incorporated in one statute, some slight alterations being at the same time introduced. In connection with the new legislation of 1903 a new statute has been issued concerning the territories in question, with essentially the same provisions as those of the previous law.

The above law enacts that the timber of fir and pine shall not be shipped for export nor be sawn up at saw-mills, unless the trunk, at a height of 4·75 meters (15·6 feet) from the base, measure at least 21 centimeters ($8^1/_4$ inches) in diameter, the bark not included. The penalty for an infringement of this stipulation is that the timber shall be confiscated, and deemed forfeited from the owner. Yet it is provided that any owner of woods shall be at liberty to apply to the overseer in the »revir», whether it be necessary for the proper care of his woods that the underwood and undergrown timber be cleared, as also if he desires to have such timber shipped for removal or sawn up. — According to the *new* statute of 1903

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the prohibition of lumbering and selling timber that is undersized only refers to fir and pine wood which is not dead, being thus a moderation of previous provisions. On the contrary, export of such timber has been prohibited, not only through shipping but also by way of rail. Besides this, the law has been completed with provisions anent the prevention of young woods being lumbered for the manufacturing of wood-pulp, except upon special permission.

All the new laws above mentioned have been promulgated on July 24, 1903, and come into force on January 1, 1905, with the exception, however, of the *alterations* in the law for the Läns of Vesterbotten and Norrbotten and the new statutes concerning the management of certain public forests, which are to be valid from January 1, 1904.

Instruction in Forestry.

In order to be qualified to obtain an appointment in the Forest service, it is necessary for a candidate, not only to have served one year in a »Revir» as an aspirant, but also to have passed in all subjects the examination held at the close of the higher course at the **Institute of Forestry**. As a State institution this educational establishment dates from the year 1828. The honour of having called the institution into being belongs to *Israel Adolf af Ström*, who in other ways, too, has occupied a prominent position in the history of Forest Economy in Sweden. Already some years previously to the founding of this State institution he had established a private college of forestry.

The statutes now in force regulating the Institute of Forestry, as well as the other educational institutions in the Forest service, date from 1886, subject to the modifications and additions made in 1893 and 1903; these were chiefly concerned partly (1893) with the lower course then introduced at the Institute for the training of foresters to enter the employ of private owners of woods, and partly (1903) with an increase and a change in the time of study. To be admitted to the *higher course* at the Institute of Forestry, it is compulsory to have passed the university entrance examination on the scientific line or, if the examination has been passed on the classical, to have taken a complementary examination in Mathemathics, Physics, and Chemistry, corresponding to the tests in those subjects on the scientific line. Moreover, it is enacted that applicants shall have gone through the course of instruction given at the *Omberg School of Forestry*, at which in 1886 an one-year course was instituted preparing for the Institute of Forestry. Owing to the great number of applicants, a similar forest school has during 1900 been organized at the Crown park of *Kloten*.

The course of the Institute itself is a two-year one, embracing theoretical instruction and practical exercises, the latter taking place chiefly in the summer time of both years, during nearly four months each year. The theoretical course includes: firstly the following branches of the science of Forest Economy: Forest Management, Forest Technology, Forest Architecture, Geodesy, Partition of Forests, Forest Mathematics, and secondly the following subjects in sciences allied to Forest Economy: Botany, Diseases of Trees, Knowledge of Game, Geology and the Science of Soil-composition, Zoology, Mineralogy, Chemistry, Physics, Meteorology and Climatology, Economical and Financial Law, Forest and Game Laws, together with general Law, Political Economy, Rural Economy, and Book-keeping.

The number of *pupils* in the higher course is limited to 20, that is to say 10 in each division; at present the maximum number is raised to 30. To the

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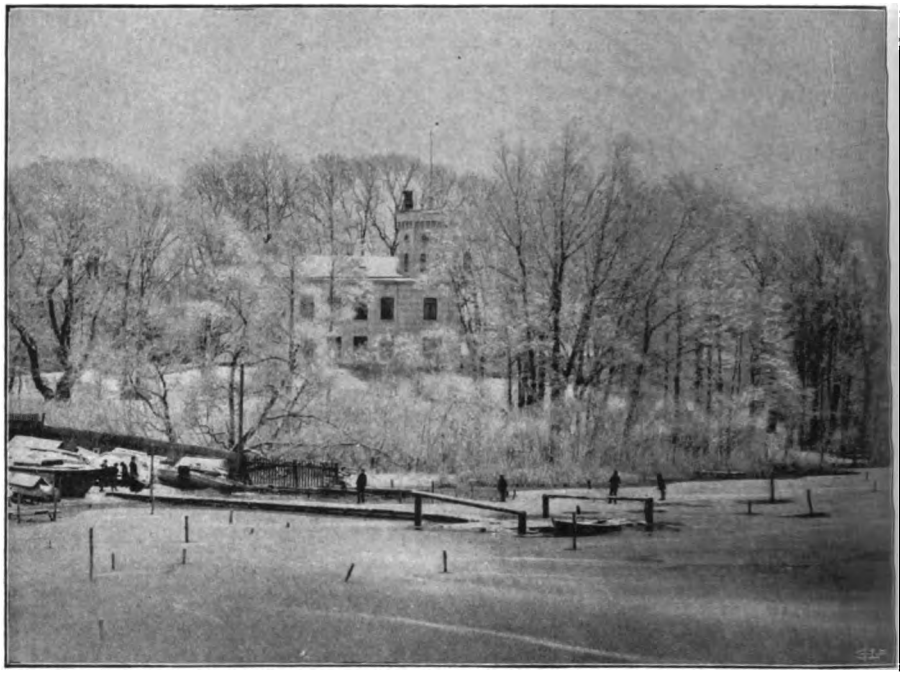

The Institute of Forestry, in Stockholm.

lower course as many pupils are admitted as there is room for. The right to enter the lower course belongs to any youth who shall have obtained his remove to the Lower Sixth class of a State College (i. e. four years previous to university entrance), and shall have since then been employed, for at least two years, in practical work of a nature to come under the heading of Forest Economy.

The teaching staff at the Institute of Forestry consists of a Director, two Lectors with permanent appointments, and four other teachers. One or two Assistants are also engaged to take part in the practical instruction.

The number of **Forestry Schools** belonging to the State is eight. Two of them are exclusively occupied with imparting preliminary instruction to the candidates for subsequent entrance to the Institute of Forestry. The chief stress is here laid upon the acquirement of practical experience. The remaining six forestry schools are concerned with the training of competent rangers.

Instruction is given in Forest Economy, Botany, Zoology, Mathematics, Mapping, Writing, Arithmetic, the Arts of Hunting and Shooting, and Laws that concern the duties of a ranger. Practical subjects treated include: the Surveying of Woods and Fields, Sylviculture, Thinning and other forms of working up Woods, etc. The course lasts one year. At each school 10 pupils annually receive not only their lodging free, but also scholarships which approximately cover the cost of their board. The majority of the pupils who go through these schools enter the service of private owners of forests, and in many cases they have by degrees attained, thanks to their business talent and general capacity, to positions of trust and eminence among the representatives of the saw-mill industry in Sweden.

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2. FOREST INDUSTRIES.

At the remote period when the population of Sweden began to enter into more lively commercial relations with other nations, it would appear that the forest products already formed a considerable part of Swedish export, although at first the demand mostly comprised other forest-products than those which are now the most important.

From various documents of the Middle Ages we find that furs and hides of different game of the forests (elk or moose, deer, etc.) were in great demand as articles of commerce, which were bought in the Swedish ports by foreign traders. From Sweden the **Hanseatic cities,** which at the close of the Middle Ages commanded the commerce and navigation of Northern Europe, took their requisite supplies of pitch, tar, masts, and spars, as well as, to a certain extent, of firewood, deals, and boards. The boards exported went by the name of hewn boards, i. e., not having been sawn, but hewn by axe direct from the log.

In the beginning of modern times the **Dutch** inherited the commercial supremacy of the Hanseatic cities in the North, and also became the principal purchasers of Swedish timber. As they were in need of much timber for their great commercial and naval fleets as well as for dams, piles for building purposes, etc., which could not be obtained in their country, so poor in forests, the Swedish export of timber to Holland became very extensive for those times. The timber shipped consisted principally of masts, spars, and balks, hewn by hand, and logs, which were in Holland afterwards sawn in the wind saw-mills, so numerous there. — During the eighteenth century, the position at the head of the world's commerce and navigation passed from Holland to **England,** which country, for nearly the same reasons as Holland, found it necessary to import timber.

In order to give an idea of the extent of the Swedish timber trade at the beginning of the nineteenth century, it may be mentioned that in the year 1809 Sweden exported about 220,000 dozen boards and deals, about two thirds of which went to England. The whole timber export was then estimated at a value of 5,488,000 kronor, which equaled one seventh of the total export of the kingdom at that time.

During the Napoleon wars, the development of the timber trade underwent a change. This was effected in England by the introduction in 1809 — chiefly as a retaliatory measure against Napoleon's system of isolation — of a very considerable increase of the former import-duties on timber from the Continent, which increase was further raised the following year and rose once more in 1813, so that the import-duty per load thus finally amounted to 3 £ 5 shillings. These custom-duties had all the greater effect on the European exports to England, as at the same time only an inconsiderable duty was paid on the timber imported from British North America. Consequently commerce between Sweden and England greatly declined. After the termination of these wars, the English custom-duties on timber were certainly lowered in 1821 to 2 £ 15 *s.* per load, while at the same time a duty of 10 s. was imposed upon American timber. The difference was, however, still large enough almost entirely to exclude European timber from English ports. It is even said to have happened that such timber would first be transported across the Atlantic and afterwards, benefiting by the said privilege as to duty, be at last returned to some English port. The possibility of any direct importation of Swedish timber taking place, depended alone on the fact that the latter was more highly valued than the American product.

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Marking trees for felling.

Finally, a change of opinion became prevalent in England, when that country's need of timber for different industrial purposes became essentially greater. Considerable reductions were made in the custom-duty on timber in 1842 and 1851. That duty was further reduced again in 1860, so that it only amounted to one or two shillings per load, and at last is was entirely abolished in 1866. With this measure the Swedish timber export gained a market, sufficiently exten-

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sive to create in Sweden a real timber industry. The foreign market for Swedish timber was also increased by the commercial treaty with France of 1865, whereby various forest-products imported from Sweden, among which were boards and deals, were relieved from the former custom-duties.

At the same time the *commercial legislation of Sweden* underwent important changes. During the eighteenth century sundry restrictions had been in force both in regard to the foreign timber trade and as to commerce generally within the kingdom. Thus e. g. for boards sent to Stockholm certain dimensions were stipulated by law. These regulations, obstructive to free exchange, were gradually abolished during the first half of the nineteenth century (more particularly so by the General Commercial Regulations of 1846). Export-duties were formerly imposed on many different kinds of timber, such as rough, sawn, or hewn timber of most kinds of hard wood, unhewn red wood and white wood, and small beams and spars, while boards and deals of red wood or white wood were free of duty. Most of these export-duties were removed in 1857 and ceased entirely on the introduction of the customs' tariff of 1863.

As the foreign demand was principally for sawn timber, the **Saw-mill industry** in Sweden was given a new importance. It is not known with certainty when the first saw-mills were constructed in our country; this may possibly have been done as far back as the Middle Ages. It is certain, however, both that there have been water-power saw-mills in use in this country for several centuries and, on the other hand, that it was not until during the nineteenth century that the saw-mill industry attained the character of a genuine manufacturing concern. The initiative step was taken by some prominent Gothenburg merchants, some of whom were of British birth and through their connections familiar with the steadily increasing demands of English industries for wood. In the decennium 1841/50 vast forests were bought first in Vermland and Dalsland, afterwards in Norrland, and large water-mills with several saw-frames were built. These saw-mills were mostly situated at some water-fall in the proximity of the coast, but the fact that they could not be built close to the sea-shore, proved a disadvantage; for before the sawn timber could be shipped, it had either to be carted overland or towed in barges to the sea-port, which was rather expensive, or else it had to be floated, which on the other hand caused a deterioration in the appearance and quality of the timber. In this respect, the establishment of *steam saw-mills on the sea-coast* produced a complete revolution, whereby essential advantages were gained. By locating the saw-mills on the coast, the formerly usual, long transport of the timber from the saw to the port was saved, furthermore, the use of steam-power in the saw-mills brought about a greater productive capacity, a finer product, and freedom from the obstacles to the even run of the work arising from ice in winter and lack of water in summer. The first steam saw-mill in Sweden was built in 1851 at Vifsta, near Sundsvall; the next in order was Kramfors, in Ångermanland (1852). During the years 1851/60 and especially in the following decennium of 1861/70, the number of steam saw-mills grew rapidly. The timber industry was also greatly promoted by the growth and development in Sweden of commercial companies, thanks to the Law of 1848 regarding joint-stock companies, by which measure the co-operation of several persons in large industrial enterprises was facilitated.

We may add to this the enormous improvements the *means of communication* have undergone. Formerly the shipping of Norrland timber was performed principally by sailing vessels from that part of the country, which could make at most two trips a year only to the ports of destination in England and France; a voyage to the Mediterranean and back took a whole year. The freight to England might then amount to £4 1/2 per standard. Since steamships began to be used in the timber trade and consequently the voyages altogether became more

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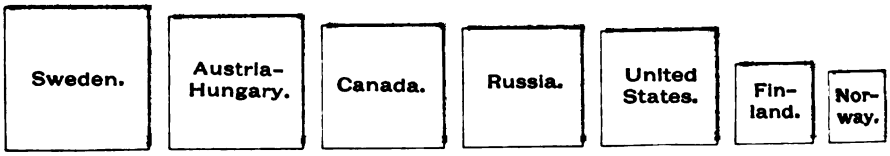
Value of unwrought timber exported from the principal exporting countries. Yearly averages 1891/95, in kronor. (A krona = 1·10 shilling).



113 million. 93 mill. 84 mill. 82 mill. 76 mill. 37 mill. 28 mill.

rapid, the costs of transportation have considerably decreased. The re-building of the Trollhätte Canal (1838/44) was a very great advantage to the export via Gothenburg, and finally we only need to point out the revolution in the transportation system which was brought about by the railways.

The saw-mills, when first established, had but little difficulty in getting their necessary *supply of timber*. Although only the largest and soundest redwood timber was cut, and all unsound inferior timber and whitewood, together with rather big top-logs were left, still it was not necessary to penetrate far into the forest from the sea or the great rivers in order to get a sufficient amount of raw material. But with the constantly increasing demand from abroad and the increase in the number of steam saw-mills, this state of things soon changed. The easily accessible heavy timber nearest to the watercourses began to be exhausted, and it became necessary to select the raw material from the upper courses of the rivers. At the same time it began to pay to make use of both whitewood and poorer redwood, which had hitherto been left with contempt in the forest.

For rather more than two decades from the founding of the first steam saw-mills, the saw-mill industry in Norrland continued, under favourable circumstances, to expand, and there arose a regular immigration of indigenous and foreign speculators and of workmen from the southern parts of the country. The workmen's wages now had risen to a very high standard, and the manner and habits of life among the unstable population of workmen were also in accord with that standard, but as long as the prices of timber continued to rise, everything went on in its ordinary course. In 1874, however, a turning-point was reached, the foreign market beginning to fluctuate, and the prices after having once more risen somewhat in 1877, sank the next year at a breakneck speed. The average price of sawn timber in Sundsvall, which in 1874 was up to 170 kronor per standard, fell in 1879 to 76 kronor. A fearful commercial crisis followed. In one respect, however, it brought about a good result, by clearing the timber trade from a considerable amount of unsound elements, from persons whose only purpose was to make a fortune as rapidly and with as little work as possible, without the slightest heed of the future stability of the industry or of the future of their workmen. For the men of better character engaged in this industry, the hard years brought with them many wholesome lessons; they learned to neutralize the fall in prices by more carefully utilizing the standing timber, by employing cheaper methods of work at the mills, by a more perfected working up of the timber and a more thorough utilization of the waste wood which was formerly considered worthless. The prices of timber have since then gone through several fluctuations but none so violent as those just mentioned. This matter will be referred to further on.

In order to illustrate the *growth* of the saw-mill business, a few figures may here be given. In 1821 (the same year that the first reduction of custom-duties in England took place), Sweden had 3,633 saw-mills with an output of

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TABLE 86. *Sweden's imports and exports of timber (unwrought and wrought).*[1]

Average for the years	*Imports.* Thousands of kronor.			*Exports.* Thousands of kronor.			In % of the total	
	Unwrought.	Wrought.	Total.	Unwrought.	Wrought.	Total.	Imports.[2]	Exports.[2]
1871/75	888	848	**1,736**	84,739	6,439	**91,178**	0·70	44·58
1876/80	887	1,085	**1,972**	88,308	10,596	**98,904**	0·73	47·18
1881/85	1,696	1,639	**3,335**	96,506	13,460	**109,966**	1·05	45·12
1886/90	1,970	1,767	**3,737**	98,519	18,257	**116,776**	1·12	42·84
1891/95	2,315	2,238	**4,553**	113,098	23,621	**136,719**	1·30	42·96
1896/00	3,962	1,479	**5,441**	144,356	35,123	**179,479**	1·20	50·05
In 1897	4,936	1,552	**6,488**	150,303	31,564	**181,867**	1·59	50·77
» 1898	4,000	1,526	**5,526**	146,402	30,923	**177,325**	1·22	51·42
» 1899	3,213	1,538	**4,751**	140,118	38,436	**178,554**	0·94	49·85
» 1900	4,407	1,519	**5,926**	153,750	46,809	**200,559**	1·11	51·25

267,000 dozen deals and boards, about 200,000 dozen of which were exported. Forty years later, our country owned 59 steam saw-mills and 4,933 water or wind saw-mills, and the export of deals and boards alone amounted to 1,478,000 dozen. After the lapse of fifteen years more, this export had been trebled again, and the total export of all classes of rough timber rose to a value of upwards of 100 million kronor, and in our times the value of the timber export has attained the figure of 150 million kronor (in 1897 and 1900).

In the **foreign trade** of Sweden, its timber accordingly takes a most prominent part, respecting the *exports* of the country. Although, under the present heading, we only have under consideration »unwrought or rough» (embracing also partly wrought) timber, we introduce in Table 86 wrought goods as well, in order to give an idea of the importance of the wood industry as a whole in our country.

During the last years it will thus be seen that timber has represented about *half* of our total export. A gladdening presage is the very strongly rising export of wrought timber. If, to return to the subject now before us, we consider only the »*unwrought*» (sawn or hewn) goods, their percentage of our total export during the quinquennial periods of 1871/1900 has amounted, consecutively, to: 41·43, 42·08, 39·60, 36·14, 35·54, and 40·26 %, figures which, on the whole, indicate a falling-off in the relative importance of these exports. In 1900 the figure amounted to 39·29 %.

In ordinary years Sweden at the present day takes the foremost place among the timber exporting countries of the world. This is owing to its rich supply of timber, the facilities for getting the timber out of the woods — afforded us by the winter's cover of snow and the frozen lakes and marshes —, the numerous water-courses which are

[1] Somewhat inappropriately our statistics include in the same group as *unwrought timber* also sawn, hewn and planed timber, i. e., deals, boards, etc., the exports of which amounted in 1900 to a value of about 132 million kronor. A krona is equal to 1·10 shilling or 0·268 dollar. — Wood goods in our statistics also include *matches*. — [2] Imports and exports of wood by % of the entire imports and exports of all wares.

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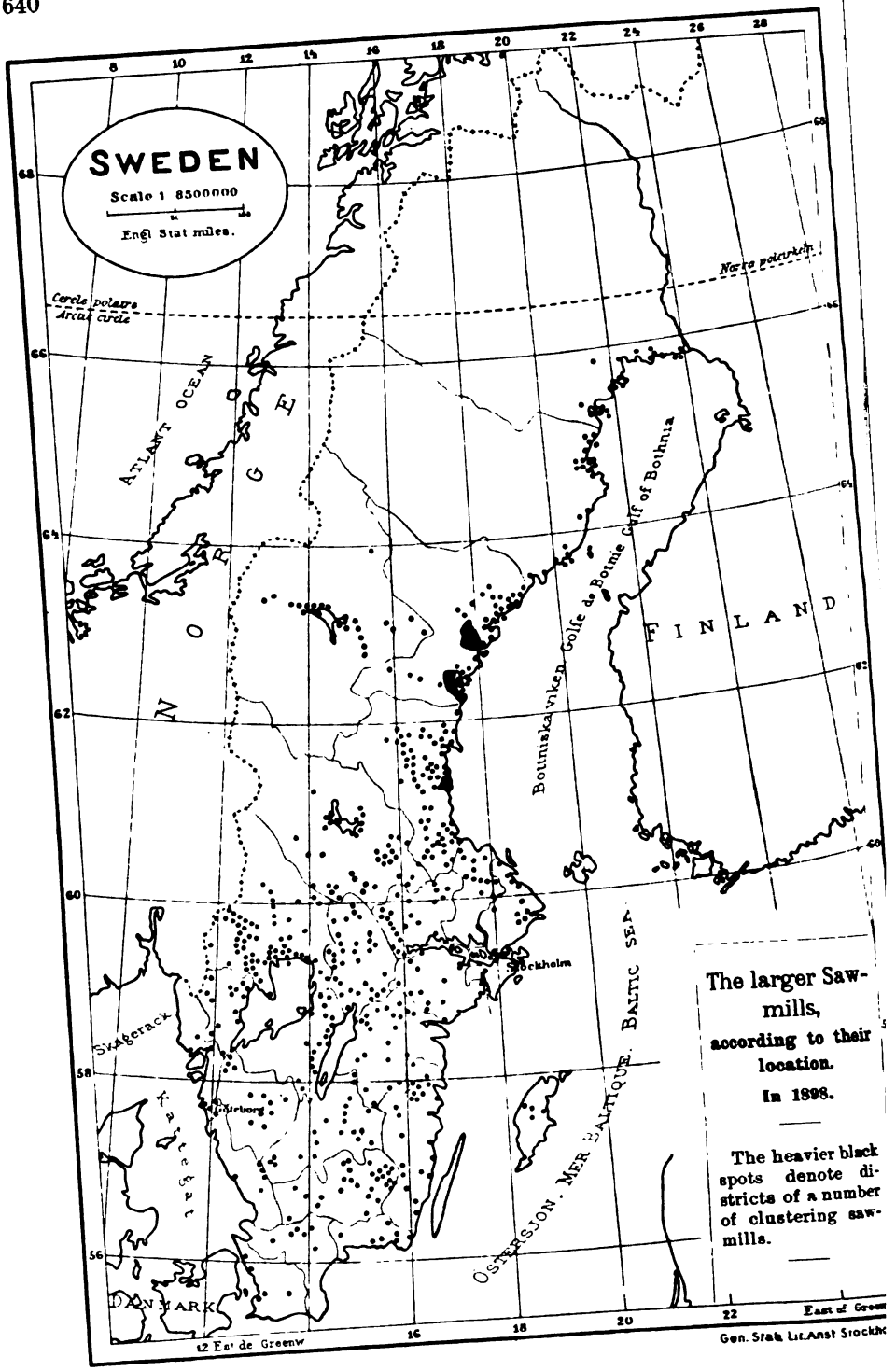

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suitable for floating, and the excellent quality of the Swedish timber, a good heartwood and particularly free from knots, which makes it especially suitable for joinery purposes. In comparison with certain other richly wooded countries, Sweden is also favoured by its convenient situation for navigation and its many good harbours.

Saw-Mills.

In 1900, the value of the output from saw-mills and wood-planing mills was stated to be 163,481,440 kronor, — a far higher amount than any other class of manufactures could show. It constituted no less than 15·63 % of the value of the output from all the manufactories of the kingdom. The income of the trade was estimated at about sixteen and a quarter million kronor. The number of workmen occupied in this industry amounted to 43,312. During that year, 1,835 saw-frames and 769 planing-machines were in use. As motive power, 536 water-wheels or turbines and no less than 859 steam engines were employed for the mill-work proper, and 10 water-wheels and 109 steam-engines besides for running electric motors. The whole number of electric motors is given as 282, a figure which is likely to be too low.

TABLE 87. *The manufacture at saw-mills, in 1900.* By cubic meters. *

Läns.	Deals and battens.	Boards.	Planed boards.	Board- and deal-ends.	Other kinds.	Total. Cubic meters.
Stockholm	43,396	25,316	9,861	100	14,202	**92,875**
Uppsala	126,511	80,400	16,635	11,588	18,746	**253,880**
Södermanland	33,226	24,552	1,669	90	23,598	**83,135**
Östergötland	80,033	41,626	18,059	2,795	34,838	**177,351**
Jönköping	21,972	36,671	17,380	60	17,657	**93,740**
Kronoberg	41,598	46,936	10,230	313	30,422	**129,499**
Kalmar	42,894	32,840	1,679	145	9,694	**87,252**
Gotland	1,755	1,825	155	5	5,870	**9,610**
Blekinge	4,520	4,144	7,670	—	3,045	**19,379**
Kristianstad	4,382	4,329	60	—	6,483	**15,254**
Malmöhus	3,845	6,035	6,760	—	7,614	**24,254**
Halland	12,475	6,422	2,916	74	3,441	**25,328**
Göteborgs o. Bohus	85,892	35,482	83,901	702	56,044	**262,021**
Elfsborg	33,505	30,251	6,901	500	16,697	**87,854**
Skaraborg	14,437	11,198	4,575	6	6,223	**36,439**
Vermland	269,721	96,541	22,053	6,689	114,594	**509,598**
Örebro	46,980	33,801	11,273	293	12,771	**105,118**
Vestmanland	23,866	23,179	5,511	691	15,086	**68,333**
Kopparberg	150,197	88,319	32,969	1,253	65,584	**338,322**
Gefleborg	564,455	430,474	185,383	84,789	147,952	**1,413,053**
Vesternorrland	1,046,863	604,223	252,485	180,391	355,004	**2,438,966**
Jemtland	63,355	27,284	14,416	1,730	23,291	**130,076**
Vesterbotten	347,212	169,091	47,378	66,594	64,022	**694,297**
Norrbotten	301,562	116,504	6,096	46,473	61,284	**531,919**
Total	**3,364,652**	**1,977,443**	**766,015**	**405,281**	**1,114,162**	**7,627,553**

* A cubic meter = 35·32 cubic feet = 0·3532 register ton.

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The output of the principal kinds of wood was divided among the different Läns as shown by Table 87. As will be noticed, the Län of Vesternorrland stands decidedly foremost, giving about 30 % of the total production of the kingdom; next in order comes the Län of Gefleborg. — The total number of saw-mills and planing-mills in Sweden, of the character of genuine factories, is stated to be 1,148. The provinces situated north of the River Dalelfven embrace about one third of the saw-mills of the kingdom. Numerically considered, they have consequently no preponderance; but all the more through the great extent of their business.

In the preceding part, we have already referred to the strong influence that the company organization has had on the development of the saw-mill industry. Among the 1,148 saw-mills and planing-mills 389 were owned by joint-stock companies (with limited liability) and 248 by firms and partnerships, — thus making together more than half. The preponderance of the companies is, however, still greater than shown by these figures, since nearly all the largest export saw-mills are in the hands of companies, mostly joint-stock ones.

The following survey of the **principal saw-mills** will show their situation within different districts of the country.[1]

If we begin with the northernmost Län of Sweden, passing by a few mills of minor importance at **Haparanda** and in its vicinity, we find in the parish of Neder-Kalix the *Båtskärsnäs* saw-mill, owned by a joint-stock company of the same name. The mill is provided with 4 saw-frames, 2 edging-benches, and 1 heading-machine, and annually ships about 7,000 standards of sawn goods, besides a large quantity of hewn timber and so-called Dutch balks. In the same parish at the mouth of the Kalix elf, lie *Karlsborg* and *Nyborg*, having together 12 saw-frames and shipping about 15,000 standards of sawn timber. Somewhat further to the west lies *Törefors*, with 3 saw-frames and an annual shipping of 7,000 standards of sawn timber. Recently, most of the important saw-mill owners of the Län of Norrbotten have rallied into a trust, named Nordiska Trävaruaktiebolaget; this trust runs, among other saw-mills, Karlsborg, Nyborg, and Törefors (see above), and in the **Luleå** shipping district, *Altappen*, *Karlsvik*, and *Stensborg*.

In the district of **Piteå** lies *Munksund* (owned by the Munksunds Sågverks Aktiebolag) with 6 saw-frames, and shipping about 10,000 standards. On the River Lilla Pite elf lies the *Storfors* saw-mill belonging to a joint-stock company with the same name, which also owns *Bränfors* in the Län of Vesterbotten. Its shipping in all likelihood reaches a total of about 13,000 standards.

In the Län of Vesterbotten we find further in the vicinity of **Skellefteå** the important saw-mills *Sävenäs*, *Lejonström*, and *Björnsholmen*, which are owned by A. Markstedt and Sons; altogether these mills have an output worth about one million kronor. *Robertsfors*, in the parish of Bygdeå, is a water saw-mill with 5 frames and 2 edging-benches. At the mouth of the **Ume** elf lie *Holmsund*, *Obbola*, and *Sandvik*, each of these owned by separate joint-stock companies. Further south, in the Nordmaling parish, are situated *Rundvik* (with 7

[1] Translation of some Swedish expressions. *Aktiebolag* = joint-stock company. *Bolag* = company or partnership. *Trävaru* = wood. *Såg* = saw-mill. *Sågverk* = saw-mill. *Ångsåg* = steam saw-mill.

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saw-frames) and the *Mo ångsåg;* the latter, which is the largest saw-mill north of the Sundsvall district, has 12 saw-frames and a planing-mill with 3 planing-machines; the shipping amounts to about 16,000 standards. The establishment belongs to the Mo och Domsjö Aktiebolag (see below).

The province of **Jemtland,** being distant from the sea, has only a few saw-mills of importance. The principal ones are *Ocke* and *Trångsviken;* both ship their products over Norway.

Log-cabin for wood-cutters.

Vesternorrland, on the other hand, is distinguished for its abundance of big mills, only a few of which can here be mentioned. Belonging to the **Örnsköldsvik** shipping district, there are *Husum*, *Järfed*, with 9 saw-frames, *Köpmanholmen*, and *Domsjö*, with 7 saw-frames, a planing-mill with 2 planing-machines, and a shipping of 9—10,000 standards; it is owned by the Mo och Domsjö Aktiebolag. In order to give an idea of the forest areas occasionally connected with the large saw-mills, we may here as an example state that the last mentioned company owns 150,000 hectares (an hectare = 2·47 acres) of forest, has the right of cutting timber on other 130,000 hectares, and possesses besides 30,000 hectares of privileged forest, this company being one of the few which up to our days have retained some of the old timber grants called »Stockfångst-privilegier» (in regard to which further reference will be made subsequently, p. 646). The last mentioned privilege will very likely soon cease, negociations having been entered into with regard to the redeeming of the same by the State.

Along the **Ångermanelfven** (the district of Hernösand), the large saw-mills are densely crowded. At Nyland, where the river begins to be navigable for sea-going ships, we find the first steam saw-mills. Not far from Nyland lie *Marieberg*, *Köja*, and, on the southern banks, *Bollsta*, belonging to Graningeverkens Aktiebolag and shipping about 12,000 standards of sawn timber and 7,000 Dutch balks. Further down lie *Lugnvik* and *Hallsta; Dal*, with a large planing-mill; *Sandö* on an island in the river; *Sandviken*, *Kramfors*, *Strömnäs*, and *Sprängsviken*, of which the most important is Kramfors (belonging to a joint-stock com-

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pany with its seat in Gothenburg). It has altogether 12 saw-frames, besides 3 planing-machines, edging-machines, charcoal-works etc.; it ships 18,000 standards of sawn timber and 3,000 standards of planed wood-goods annually. Near Hernösand lies *Ulfvik*, with 5 saw-frames, shipping 7,000 standards, and in the town itself there is *Hernösands ångsåg*, formerly owned by English proprietors, but now belonging to a Swedish joint-stock company; its annual shipping is estimated at about 6,000 standards.

The Sundsvall (or Medelpad) district stands foremost of all, both with regard to the magnitude of its shipping and most particularly as to the prices obtained for the wood-goods. The first saw-mill owner there is Skönviks Aktiebolag, which is running, among others, the great steam saw-mills of *Skönvik* (with 15 saw-frames, 3 edging-machines, 3 planing-machines, and 2 circular-saws), and *Östrand* (with 11 saw-frames, 2 edging-machines, 2 planing-machines, and 2 circular-saws). The company was organized in 1861 and has had a most successful career, at the same time that it has sacrificed large amounts in experiments made for chemical and technical purposes. Its total shipments amount to about 20,000 standards of sawn wood-goods (8,000 standards of which are planed), 15,000 to 20,000 Dutch balks, and 1,500 standards of other wood goods, besides charcoal.

Log transport in the forest.

Vifsta varf, north of Sundsvall is, as already has been mentioned in another connection, the oldest steam saw-mill in Sweden. It was founded in 1851, but has since been rebuilt and extended. The company which owns it has been celebrated for its dividends, which we should say are unique in Sweden (amounting to as much as several hundred per cent per annum on the original value of the shares); lately (1896) it has been reorganized into a company with limited liability. The saw-mill has altogether 14 saw-frames and 3 planing-machines, and its shipments amount to about 18,000 standards. The same company also owns *Byn*, a saw-mill of rather large size, near Sundsvall.

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As the third in importance of the great saw-mill establishments in this district, we should mention *Svartvik*, situated near the outlet of the Ljungan river south of Sundsvall. It consists of two steam saw-mills with together 16 saw-frames and 5 planing-machines, etc. The output is valued at about 2,600,000 kronor; the shipments are estimated at from 20,000 to 25,000 standards, of which 10,000 or 12,000 standards consist of planed wood. Svartvik was formerly owned by the Dicksons, of Gothenburg, a family famous in the history of the timber trade, but the concern now belongs to the Trävarubolaget Svartvik (not limited).

J. A. Enhörnings Trävaruaktiebolag is also one of the most important timber exporters, owning the *Kubikenborg* mill (with 8 saw-frames) south of Sundsvall, and it has the lease of *Ortviken* (with 10 saw-frames), north of this town. Its estimated shipments amount to 20,000 standards of sawn timber, 10,000 standards of planed wood, and 5,000 loads of hewn timber. *Fagervik*, near Vifsta varf, ships 15,000 standards sawn and 2,000 standards planed timber and a large quantity of square timber. Besides these, we need further only mention *Mon* (the oldest and most renowned planing-mill in this district), *Sund*, *Johannedal*, *Klampenborg*, and *Tunadal*, in the vicinity of Sundsvall; on the Alnö island, which protects the harbour of Sundsvall from the sea-storms, lie *Karlsvik*, *Hofvid*, *Eriksdal*, *Gustafsberg*, *Nacka*, *Strand*, and *Johannesvik*, and on a small island near Alnö is the *Hörningsholm* saw-mill (belonging to two private persons).

If we then pass on to Helsingland, we find in the vicinity of **Hudiksvall** the three steam saw-mills *Bergsjö*, *Forssa*, and *Håstaholmen*, and further in the interior of the country, *Hybo*. Of their products, reaching to about 22,000 standards, a large proportion (about 8,000 standards) is sold after being converted into planed wood. *Iggesund*, south of Hudiksvall, is one of the largest water-mills in Sweden, with 7 saw-frames and an output of about 8,000 standards, of which about one fourth consists of planed wood. All these mills belong to Hudiksvalls Trävaruaktiebolag. The forests of the company embrace not far from 200,000 hectares (500,000 acres), and extend through Medelpad into Herjedalen and Jemtland.

In the **Söderhamn** district lie *Bergvik* and *Ala*, belonging to a large joint-stock company with partly English capital. *Ljusne*, belonging to the Ljusne-Voxna Aktiebolag, is an important establishment, with 14 saw-frames and 2 planing-machines; it produces an output of about 24,000 standards; the quality of its goods is also highly esteemed. The *Sandarne* planing-mill and the *Askesta* steam saw-mill are now owned to a large extent by the Bergvik och Ala Nya Aktiebolag: the shipments are estimated at 12,000 standards sawn and 3,000 standards planed wood. Near Askesta lies *Marma*, belonging to a Swedish joint-stock company.

The **Gefle** district competes with the Hernösand district in regard to the export of sawn timber, and is second only to the Sundsvall district. The two biggest saw-mills of Europe (with resp. 30 and 24 frames) belong to the Gefle district. One of these is the grand establishment of the *Korsnäs* Sågverks-aktiebolag, situated at Bomhus and Löfharsudden just outside of Gefle, having been recently removed to its present site from Korsnäs in Dalarne (whence its name). The other is *Skutskär* (in the Län of Uppsala), which has a very good harbour. Both mills are connected with the Dalelfven by long canals for floating timber. The amount stated as shipped from Korsnäs is about 40,000 standards, and from Skutskär about 50,000 to 60,000 standards.

Skutskär belongs to the Stora Kopparbergs Bergslags Aktiebolag, which also owns *Domnarfvet* in **Dalarne** and the smaller saw-mills of Korså and Åbacka. Domnarfvet is principally devoted to the iron industry, but its saw-mill,

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the motive power of which is water, is yet large enough to employ about 200 workmen. Furthermore, we may mention Kopparbergs och Hofors Sågverks Aktiebolag, which owns *Avaström* and *Norrsundet* in **Gestrikland**, as well as *Näs* and *Karlsfors* in Dalarne; its shipments amount to 25,000 standards. — The *Elfkarleö* saw-mill, situated on an island in the Dalelfven, and thus on the boundary between Norrland and Svealand, belongs to Söderfors Bruks Aktiebolag, and is furnished with 6 saw-frames and 2 edging-machines. — The saw-mills of *Avesta* and *Säter*, both belonging to the Kopparberg—Avesta Aktiebolag, ship their timber via the Värtan harbour, an outport of Stockholm.

Most of the other export saw-mills in Dalarne have Gothenburg for their shipping port. Generally the timber is transported by rail to Kristinehamn at Lake Venern and from there in covered lighters to Gothenburg. Among these saw-mills, we may here mention *Vansbro*, *Mora*, *Saxviken*, and *Tyfors*. The exports from the majority of the saw-mills in **Vermland** and **Dalsland** also goes via Gothenburg; but some ship their wood over Norway. Among the saw-mills of Vermland the most notable are *Bergholmen*, near Karlstad, *Forshaga* (belonging to a joint-stock company with the same name), *Hult* (belonging to Aktiebolaget Mölnbacka—Trysil), and *Munkfors* (belonging to the Uddeholms Aktiebolag), all of which are situated on the Klarelfven.

The South of Sweden is, with respect to the saw-mill business, far behind the provinces previously enumerated. It is true that the saw-mills in this part of the country, and especially on the Småland highlands, are very numerous, being found here even in greater numbers than in Norrland, but they are mostly small — sometimes only consisting of movable locomobile saws — adapted to supply the local needs, and contribute but slight quantities for export. A few of them, however, do business on a scale which reminds us of the Norrland trade. Such are *Hellefors*, on the river Svartelfven in the Län of Örebro, *Boxholm* (waterpower), on the river Svartån in Östergötland, *Blankaholm* in the Län of Kalmar, and *Falkenbergs ångsåg* in Halland. The saw-mills of **Gothenburg** and its vicinity deserve special notice, such as the steam saw-mills belonging to the joint-stock companies of *Bark & Warburg*, *F. O. Strömman*, and *Säfveån*; they are all connected with joinery mills, however, and therefore more correctly come under the category of the wood-manufacturing industry.

Timber Cutting.

In order to obtain the necessary **raw material** for his produce, there are several different courses available for the saw-mill owner. He can either purchase forest-land under full rights of ownership; or else only lease the right of cutting timber over a certain forest area; or buy the trees marked with crown stamp from the Crown lands; or, finally, buy timber from owners of private forests.

In the »good old times», about two hundred years ago, everyone was permitted to cut heavy timber in the vast Crown forests of Vermland, Dalarne, and Norrland. During the eighteenth century this freedom was certainly somewhat restricted, but nevertheless the Crown still very generously granted privileges for the establishment of saw-mills with a right to fell timber in the Crown forests, a privilege which was called »**Stockfångst**» (see p. 623). Most frequently this log or timber-grant was restricted to a certain quantity, and sometimes reservations

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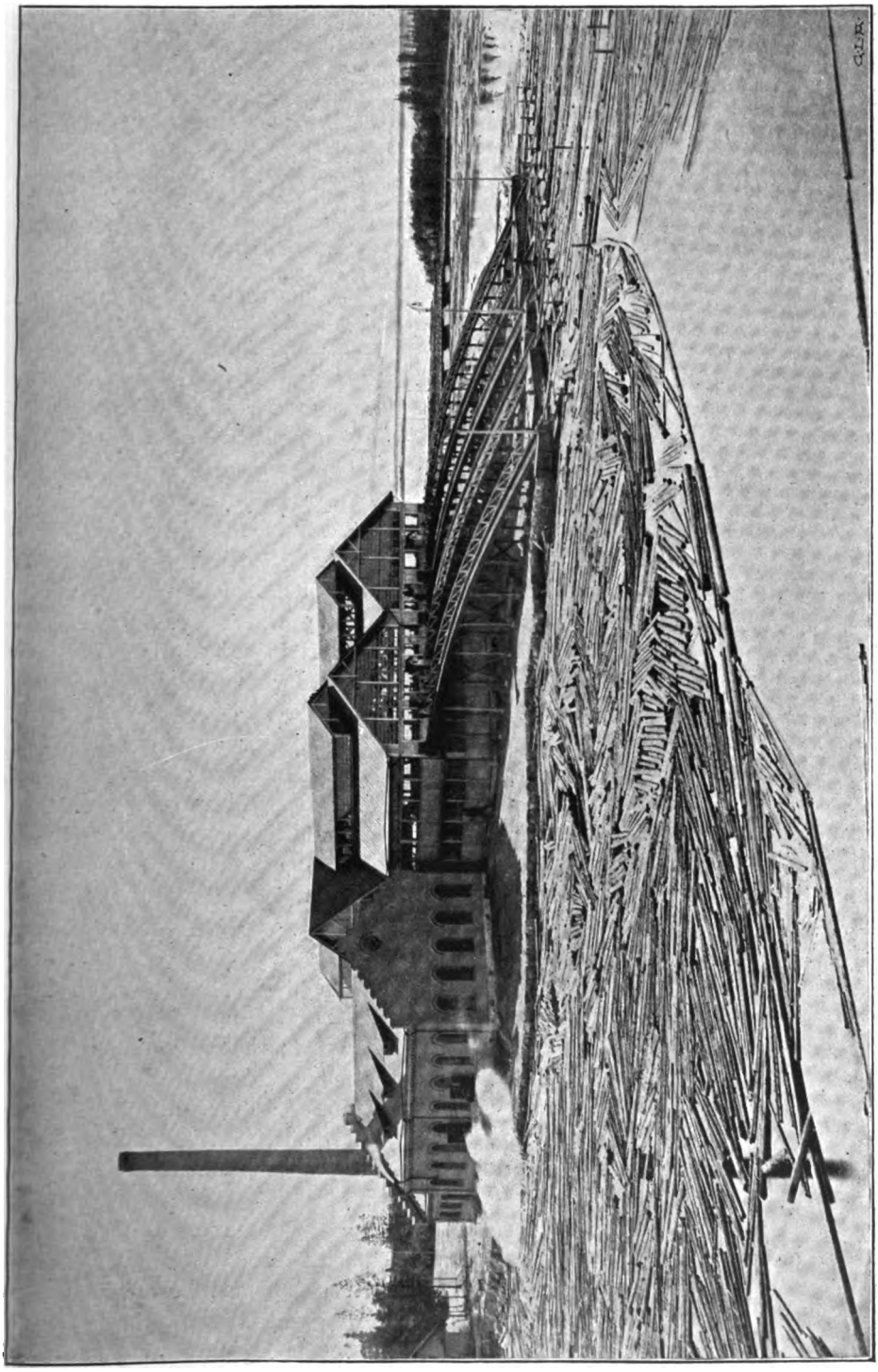

The Mo saw-mill, Nordmaling, Ångermanland.

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were made for the exclusive right of the State to mast-trees or the like. To begin with, the taxes imposed on the saw-mill business also included the payment for the forest products thus used, but later a separate charge was levied upon such products, under the name of »stubböresafgift» (stumpage). This charge was, however, very low, varying from 1/2 d. to 2 1/2 d. per tree; sometimes it was payable in kind, as in a saw-mill in Vesterbotten, where the stumpage for an annual grant of felling 1,200 trees was to consist in the delivery of 37 1/2 dozen plain red boards and 6 1/4 dozen ship-deals. After 1820, these grants of privileges ceased, and of late years, from 1870, the Government has endeavoured to abolish them altogether by offering the privileged saw-mills the right to cut a larger quantity of timber in the Crown forests during a certain limited period, on condition that their old timber grant shall cease at the expiration of this term. Thus, only a few of these privileged saw-mills still exist in the Läns of Norrbotten and Vesterbotten, and (one) in Vesternorrland. All such privileges are likely soon to be redeemed by the State.

When the great, modern saw-mills were erected, the leading men of the timber trade soon recognized the fact that the value of the forests would be considerably enhanced upon floating-costs being lowered (i. e. by regulating the water-courses) and by the introduction of improved methods of work at the saw-mills, and they consequently directed their attention to securing such supplies of forest as seemed necessary, through **contracting with private individuals.** For this purpose, contracts were entered into with private landowners or village communities, giving the saw-mill owners the right to cut timber in their forests. The terms of these cessions varied. By the legislation then in force (the law compacts regarding lease of real estate in general), the valid duration of these was limited to 50 years at the most, and this was also the term most frequently stipulated in these contracts; but, sometimes, they were only to be valid for one decennium or more. The right of felling was sometimes altogether unlimited, at other times restricted to trees of certain dimensions (varying between 7 inches in diameter at a height of fifteen feet, and 10 inches at a height of 20 feet); sometimes white fir was reserved from cutting — at a time when this kind of timber was yet considered of very little value. No doubt, these regulations have in certain cases caused some trouble. The liquidation of these timber purchases was generally made by payment of a lump-sum for the whole term of contract; the landowner sometimes also stipulated payment of a certain annual lease-rent in cash or cereals. As a rule, the saw-mills procured their cutting-rights at very cheap rates. The forests, at that time, had so little value that the peasants burned off vast tracts of timber land simply to get pastures.

These forest-purchases formed the basis of some of the fortunes made among the saw-mill owners; but with regard to the preservation of the forests, they did not prove advantageous, having on the contrary brought about such serious disadvantages that they have needs called for the special consideration of the legislators. He who

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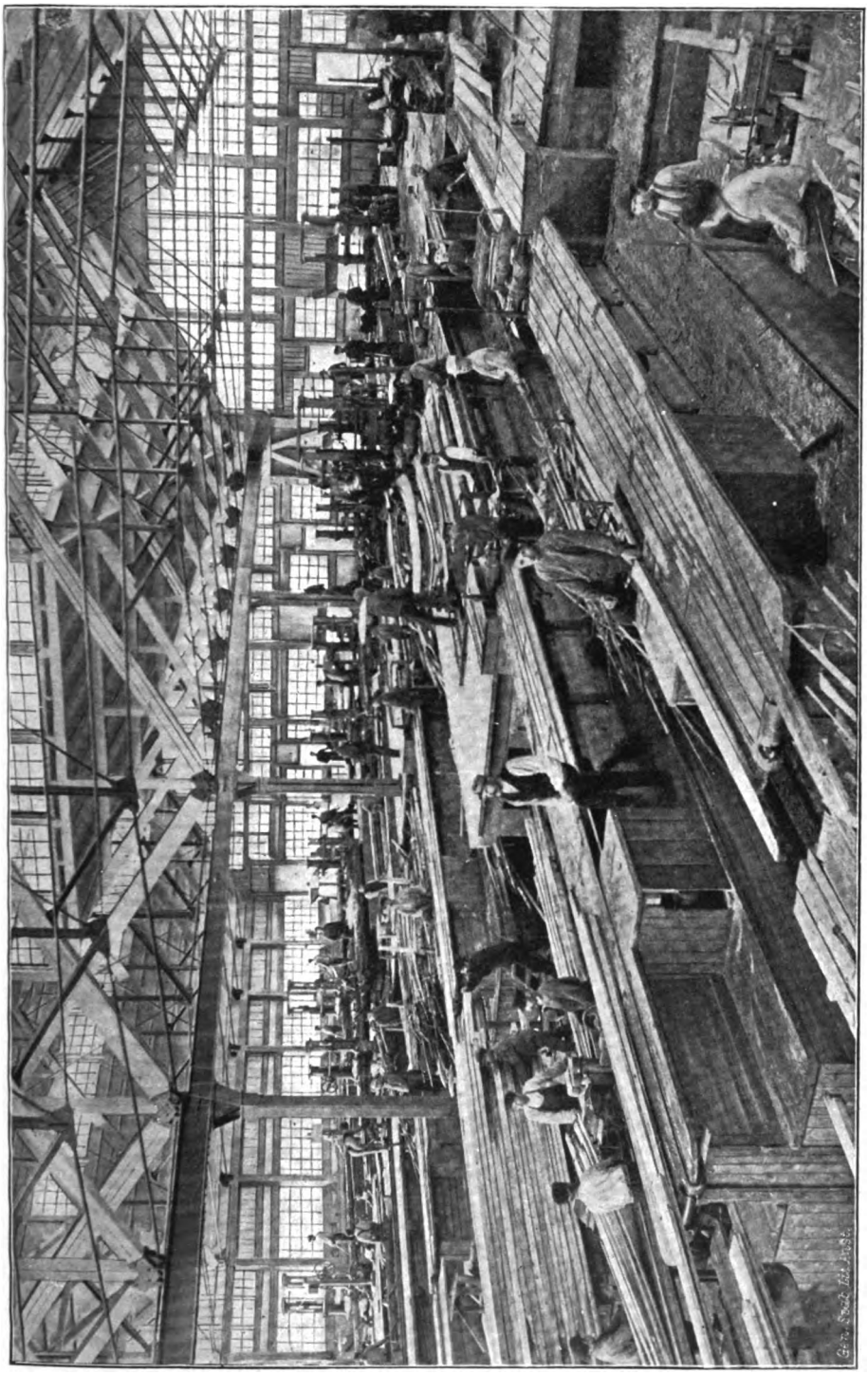

Interior of the Mo saw-mill.

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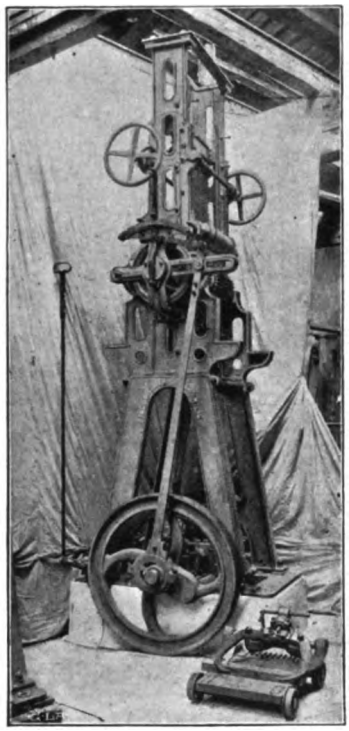
by contract has acquired the right, for a certain number of years, to fell timber in the forest lands of another person, has of course no interest in caring for the preservation of the forest, his sole aim being to derive the greatest possible profit from the forest during the term of the contract; and in the cases where there was no stipulation made as to minimum dimensions, the immature timber as well was generally taken.



Saw-frame.

But even where the cutting-right was not unlimited, many trees were felled which ought to have been left standing as seed trees or for other reasons, while other trees which, from a sylvicultural standpoint, it would have been suitable to cut down, were left standing. By a law of 1889. the longest period for wood-cutting leases was restricted to 20 years.* The object of this law was, however, only imperfectly realized. Several saw-mill companies, in order to secure forests sufficient for all future wants, had previously to this already begun to *buy up* the farms themselves, and this movement was now given a new impetus. The farms thus bought from the peasants generally consist of a large tract of forest land and a small area of cultivated or cultivable land. Of course, the purchaser, or company, has no desire to attend to agriculture, but the arable land is leased, usually to the former owner, for a very inconsiderable amount, (sometimes it is given *free* of lease) on condition that the lessee pays the taxes due on the farm.

For the care and preservation of the forests, it is undeniably advantageous that the **saw-mill companies** obtain the possession of as great extents of forest as possible; for the forests of which these companies have acquired the ownership, are generally with a view to their future existence managed far better than has hitherto usually been the case with private forests in Sweden, at least with those of the peasants. But on the other hand, this purchase of farms entails a most serious drawback, inasmuch as the *agriculture* on the companies' farms is not attended to as it ought to be. In certain cases it no doubt happens that a peasant, after selling his farm to a saw-mill company, as their tenant has his best and calmest days, because, having with the sum of payment managed to rid himself of former debts, he is thus enabled without hindrance to manage his farming, so as to obtain the best possible returns from it. Besides, it is, in various parts of Norrland and Dalarne, almost impossible for a small landowner to exist on farming alone, and so it must be considered an advantage for him to be able to expect an extra income from work done in the forests of the saw-mill companies. The late owner has,

* From 1905 inclusive this period will further be reduced, viz., to 5 years, see p. 632.

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in some places, a kind of prescriptive right to such work. Experience has shown, however, that, in many cases, the capital acquired by the peasantry through the sale of their forest land has not been used to improve agriculture, but has only been wasted on luxuries. The farmer, who was formerly accustomed to limited means and a frugal manner of living, regarded the hastily acquired sum of money as almost inexhaustible, until it also proved itself capable of quickly disappearing. In order to obtain some by-gains, the farmer has then no other resource than to undertake work at timber-felling, and this advantage then is fraught with a state of dependence, as he is compelled to accept the prices which the companies offer him. Besides, it is to be feared that the number of small freeholders will decrease in consequence of these purchases of farms. With a view to counteract these disadvantages, the law respecting the partition of lands was passed in 1896, of which further mention will be made in a following division. The question, how to conciliate the interests of the Saw-mill industry and of Agriculture, cannot yet be considered as solved; at present, a *Royal Committee* is charged to propose suitable measures. — Concerning the important reforms of 1903 in forest legislation, see page 631.

When section-felling does not take place (which felling never occurs in Norrland), all the trees to be felled are specially marked or stamped, the mark being struck both on the trunk and at the root, preferably on a coarse branch of the root, so that after felling it will be possible to verify, not only that all marked trees have been felled, but also that no others have been so. For the **felling of trees** in the forest, the owner of the saw-mill usually makes a contract with timber-drivers, who are most frequently the lessees of the company or farmers from the vicinity. If possible, the owner of the timber has some one in his own service on the spot to see that the timber is cross-cut in proper lengths; otherwise the dividing of the trees would be carelessly done, and a loss of cubic content in the logs would be the result. Where the working-place is too far from a village or farm for the workmen to live there, huts have to be built in the forest.

Usually timber cutting begins in October or November and continues all winter. This season of the year offers several advantages: the logs can then most easily be brought out of the forest, the number of workmen at disposition is greater, while farming work is discontinued, and the sawn goods taken from timber felled in winter, are better. It is customary to begin felling operations in that portion of the forest which lies furthest from the floating way. In order to facilitate the transportation of the timber, a large number of roads and tracks must be made in the woods. The main-roads are carefully made, and as substantial and wide as possible, great care also being taken to keep them in good condition; sometimes they are iced over artificially, by pouring on water. From these main-roads side-tracks branch off to the interior parts of the sections appointed for felling. In Northern Sweden with its snowy winters, only winter-roads or sledge-roads are made.

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In these times of competition, the old prodigal method of felling the tree a couple of feet above the ground, has been almost entirely abandoned, and now the tree is sawn off as near the surface of the ground as possible, and the snow, which may be sometimes one yard deep, must be shoveled away so as to give the workmen sufficient room to run the saw. The latter tool has mostly supplanted the axe in the felling operations, as more timber is wasted in chips by hewing. After the tree has been felled, it is »adapted» or cross-cut into one or more logs of suitable length. *Logs for sawing* are taken of a top-diameter of no less than five inches for white-wood, or six inches for red-wood, at a length of 15 feet. The farther from the coast, the larger the logs must be, in order to pay for their transport. *Building-timber* ought to be at least seven inches in diameter at the top, and the lengths are generally from 28 to 32 feet. *Balks* ought to be of at least 8 inches' diameter in the middle when dressed, but the length may vary. Smaller squared logs are called *rafters*. Whatever cannot be converted into larger or more valuable timber is cut up into fuel-wood, where there is a market for it.

The most usual means for transporting logs is by using the double sleigh. These sleighs are generally very simple in construction, consisting of only a pair of runners, an intermediate frame, and a cross-piece joining the uppermost or front points of the runners. Short timber and fuel-wood are conveyed on so-called long-sledges, being two or three meters in length. For very long timber double sleighs are used, to whose cross-pieces the log-ends are chained fast. In this manner tremendous loads, 10 to 12 logs, 18 feet long, can be drawn on the even winter-roads by one horse. In upper Norrland reindeer are sometimes used for driving out timber. In such places in the forests, luckily very rare, where draught cattle cannot be used, the only means of removing the logs is by handpower, and the logs are then slid top-end first down steep slopes in case the snow is sufficiently deep. Wheeled vehicles are only used in transporting timber on good roads, and of course only when the ground is bare.

Floating.

Some saw-mills are fortunate enough to have their forests so near that the timber can be driven direct to the mill. A considerable quantity of timber is also transported by rail. *Floating* is, however, the most important means of conveying timber and, besides, it is considered to have certain advantages. Coarse redwood timber which has lain in water a few months is less liable to warp or get »shaken» than if sawn immediately after felling. The floated timber, freed from sap and resin, is also easier to work and has a more even colour, while that which is not floated is supposed to be more durable. — Besides the timber intended for the saw-mills, quite a considerable quantity of balks, charcoal-wood, pulpwood, and, in some cases, even fuel-wood, is carried by floating.

If it were not for the **floating-ways**, it would, in many cases, be impossible to make use of the forest-products from the interior of the country otherwise than for local needs. Sweden's prominent position in the world's timber trade therefore depends to a certain degree upon the numerous rivers and their suitability as floating-ways. The largest

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rivers in Norrland and Dalarne, whose sources are in the high mountain ranges, have such a durable supply of water, owing to the melting snow on the mountains, that floating can, as a rule, be carried on all through summer. With regard to the water-system of Southern Sweden used for floating, as well as to the smaller rivers and tributaries of Northern Sweden, where the supply of water is only sufficient during the time of the spring floods, the lakes and mountain tarns through which they run have frequently, by means of relatively cheap dams, been transformed into adjustable water-reservoirs in the service of the floating.

Floating-way.

There is a distinction made between *public* and *private* floating-way. Nearly all main waters in Northern Sweden are public floating-ways, and also many of the tributaries. Private floating-ways now occur almost exclusively in such cases where all the forests, from which timber is to be floated down the water-courses, belong to only *one* owner. Public floating-ways are constructed, after applying to the Governor of the Län, by one or several of the forest owners interested therein. The site of the floating-way is then inspected by a functionary appointed by the Governor of the Län. The strand owners and others whose interests may be affected by the proposed regulation of the water-way having now been consulted, it is decided what constructions are to be made, what amortization should be paid in consequence thereof, about the division of the floating-course

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into sections, and the time of building. After the work has been completed, the final inspection takes place, and the floating-way is declared open; simultaneously the Governor of the Län issues regulations for a *Floating company*, which has to superintend the floating and levy costs upon the respective floaters; these costs include amortization on the building of the floating-way.

Some of our large rivers, without any alteration, and in the very same condition as Nature produced them, are used for timber floating, in greater or smaller portions of their course. For the adaptation of the *tributaries*, proportionally more work and expense are generally required, and consequently they have been later adapted to floating than the main rivers. At present most of them are probably cleared, but there are a few which are still uncleared. Whether it pays to establish a floating-way or not, depends upon the amount of timber which can be expected to be floated down it, and upon the costs of adaptation. As a rule, it may be said that it pays to adapt even quite small water-courses for this purpose.

In the main waters of a large river the work of making a floating-way consists principally in blasting away rocks which form obstructions, building wooden troughs to regulate streams or waterfalls, or to narrow the water-course, building facings along such river-banks where the strand is specially liable to get washed out, and placing booms to guide the floating timber in the desired direction, thus protecting low strand-meadows, mills and other water-works, bridge piers, and the like. In these large rivers, and besides in such smaller water-courses as flow direct into the sea, *sorting-booms* are placed at their mouths, where the floated timber is sorted according to the marks which it bears and delivered to its respective owners. In the smaller rivers, besides the aforesaid arrangements, it is frequently necessary *to build dams* to regulate the depth of the water; since these water-courses are not, like the large rivers, fed by the melting snow in the high mountains, they would otherwise contain sufficient water for floating only during the spring floods. The dams are built either at the outflow of these rivers from some lake or tarn, which by damming up can be used as a water reservoir (which is the most usual manner), or at the lower end of some swamp, which then is made to serve the same purpose, or else in some part of the water-course that runs more slowly (dead water). The dams consist of stone coffers, strengthened at the front side by banks of earth. In the dam there are openings made, which by means of hatches can be entirely or partially closed, whereby the height of water can be regulated. A special opening (the outlet-sluicer or »shoot») is made in the dam for the escape of the logs. Like the other openings it is provided with timbered walls and a somewhat sloping floor of round timber.

Floating-channels (flumes) can generally not be dispensed with in our smaller floating-ways. A precipitous stream with small water-supply, a large water fall, irregular river-beds with large stones at the bottom, — such conditions make floating channels indispensable. The trough or flume is made of timber and either supported by trestles or by beds of timber or stone, the latter when the flume lies low. In certain places the wooden channels have been superseded by flumes of sheet iron, which have proved practical. — To ensure good floating, a tolerably equal depth of water all through the channel should be maintained. Consequently, the channel must be made narrower where its inclination is greater. The width should be relatively large at the beginning of the channel and then decrease somewhat, because part of the water is always lost by evaporation and leakage. The width and depth of the channel is besides adapted according to the supply of water and the quantity of timber to be floated. In a well built floating-channel an incredibly large quantity of timber can be conveyed, even if the dimensions of the channel are not considerable.

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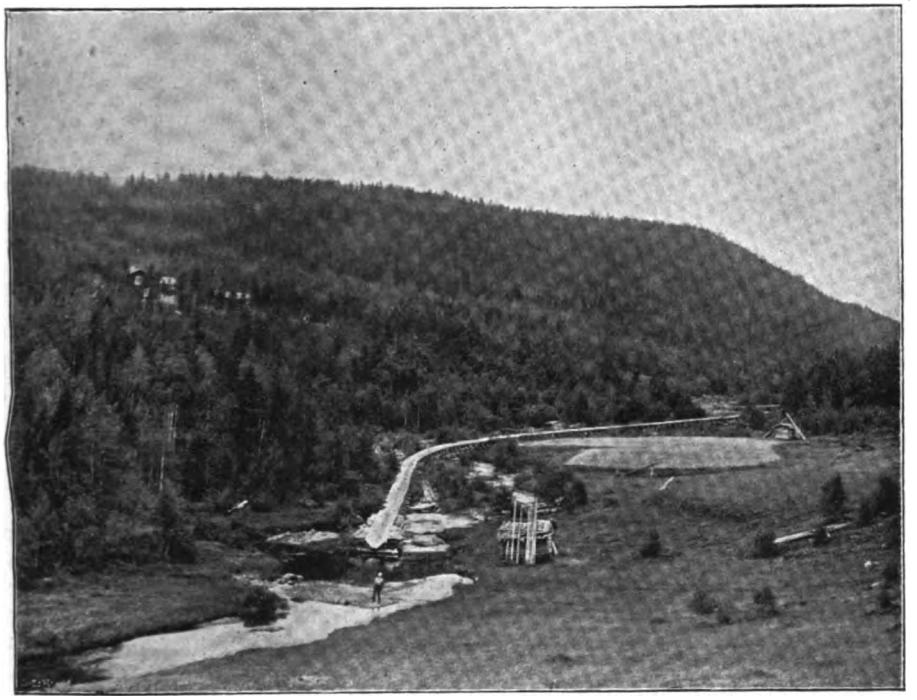
In front of the inlet of the channel there are *leader-booms*, so that the timber is carried forward by the current, toward the opening, where there are always workmen posted, however, to regulate the entrance of the logs, which should enter the channel evenly and so slowly that they do not accumulate in such numbers as to burst the channel. By means of a *system of signals* it is rendered possible, if necessary, to give notice from any part of the channel when the feeding in of the logs is to be interrupted. The lower end of the channel has a slight inclination, so that the logs will not strike against the bottom when they leave the channel. If the water-course is shallow here, there is built below the trough of the channel a »slidingbottom», of round timber, over which the logs slide; thus, this flooring receives the first shock of the issuing logs.

Other constructions also occur in the floating-ways, such as fascine-coffers, canals dug in the ground, etc. The most important means for regulating the floating ways is, however, the blasting of rocks, and their subsequent clearing from the bottom.



Floating-channel.

The work of **floating** commences simultaneously with the breaking up of the ice in spring. Especially on the smaller floating-ways, it is important to make good use of the time; in certain cases, one day's delay may be the cause of part of the logs remaining unfloated till the next year. The same result may ensue in case the number of workmen (or drivers) is insufficient. The timber may be floated separately or united in rafts; the latter method of floating being especially

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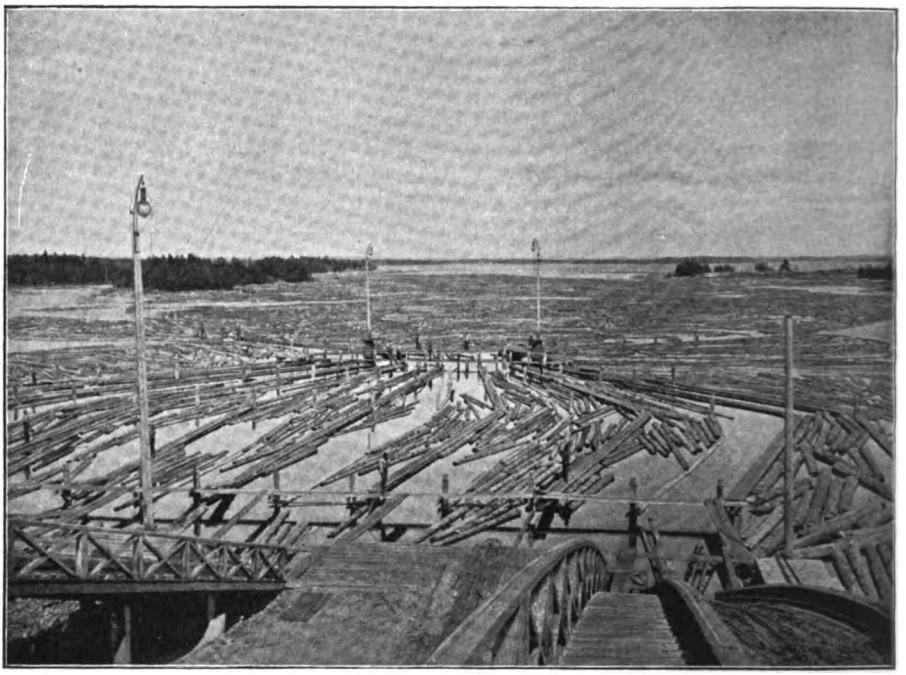
used when the water is not very rapid. If the timber is laid up on the ice in some lake or marsh, it is enclosed by booms of heavy logs — chained together, so as to form a ring-boom or «halter» frequently enclosing several thousand logs. This collection of logs (raft) is either *towed* by a steam-tug or else warped along by means of a capstan placed on a raft especially built for this purpose.



At the saw-mill.

When the timber has entered the floating-way, it is necessary to keep it clear from land by means of boat hooks (drivingpoles), to increase its speed in certain cases, and to prevent, as much as possible, the forming of »jambs» or blocking. Wherever such jambing occurs, the logs must be loosened, which may be found occasionally not only a difficult work, but also dangerous. If it is possible to find the log which has caused the jamb, it is sufficient to chop it off, after which the heaped timber comes adrift again of itself and disperses; otherwise the logs have to be hauled out of the jamb one by one. However, it is now rare that fatal accidents occur at this work. — On all floating-ways a large number of hands are stationed at the upper part of the way to break loose the logs which in floating have got lodged or fastened along the strand (strand-jambs). When these hands have brought their work through as far as the sorting-booms, the general floating is finished for the year. In most water-courses, there is now time for the logs to reach the saw-mills during the course of the *first summer* after they are felled, while formerly, before the floating-ways were regulated, it was usual for the logs to be on their way through the water-courses two or even three summers. The *loss* of timber in floating amounts, in some Norrland rivers, not even to one per cent.

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Usually the floating-way is divided into sections, and the cost is calculated separately for each section. The floating in the upper sections is relatively more expensive than in the lower ones.

Regarding the extent of the **system of floating-ways** in Sweden, there are no complete returns. Meanwhile, we may here state that the floating-ways of the Län of Vesternorrland measure more than 3,500 kilometers in length, not counting 1,000 kilometers of floatable head-waters in other Läns of rivers disemboguing in this Län. The floating-ways in the Län of Kopparberg are estimated at 2,700 kilometers at the least.

Neither can any total statement be given as to the quantity of **floated timber.** Returns are given below for some of the principal water-courses, the timber floated being given by the piece, other wood-goods being reduced into the floating-unit, »klampar».

Rivers.	Average 1886/90.	Average 1891/95.	Average 1896/1900.	In 1900.
Skellefteelf	?	?	1,347,177	1,582,210
Umeelf	?	?	1,327,487	1,867,395
Moelfven	597,620	708,580	940,919	1,000,252
Ångermanelfven	3,180,390	3,284,635	5,121,947	6,231,800
Indalselfven	2,915,740	2,557,528	3,467,283	4,071,726
Gimån	930,490	705,434	?	?
Ljungan	2,206,700	1,867,394	2,485,608	2,876,328
Klarelfven	?	1,129,175	1,460,685	1,603,030

On the River Ljusnan there were floated during the years 1891/95 on an average 804,000 saw-logs annually from the Län of Jemtland alone, and consequently the whole amount floated in said river may safely be estimated at one and a half million logs, at least. The timber floated in the River Dalelfven reaches, in ordinary years, somewhat more than three million logs (in 1901 even 5,400,000 logs).

Sawing and export.

When the floated timber has reached the saw-mill, it must first pass the *sorting-booms*, where it is sorted according to size (into deal-logs, batten-logs, etc.). By means of a windlass or capstan, the logs are now hauled up a sloping bridge into the mill. One end of the log is then attached to a frame on wheels (»log-carriage»), while the other end rests on a cylinder or roller near the *saw-blades*. The latter are stretched in a strong swing-frame, which runs up and down in the bearings of a pair of upright frames. The movement of the swing-frame is produced by a rod secured to the lower edge of the frame and whose other end is connected with a crank, which is caused to rotate by wheels. By means of gearing connected with these, the log-carriage is led forward, while the sawing is being done. On account of the evenness of Swedish timber, it has not been found necessary to make use of band-saws, the working up of the logs being made almost everywhere by gang-saws, such as described above. The number of saw-blades in a frame depends upon the size of the logs and the thickness of the boards to be sawn, so that the log is sawn up into boards at its first passage through the frame, unless square-sawing is adopted, which is frequently the case with large logs; in this case, the logs are first sawn on two outer sides, before the sawing proper begins in the next frame.

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TABLE 88. *Sweden's Exports of unwrought timber. By kind.*
Cubic meters à 35·32 cubic feet or 0·3532 register ton.

	Average 1871/75.	Average 1876/80.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.
A) *General kinds of timber.*						
Deals and boards	2,224,759	2,619,474	3,247,987	3,755,209	4,168,850	4,838,684
Deal and board ends	104,498	143,201	217,921	283,362	352,558	372,010
Beams and rafters	443,334	374,457	392,387	281,378	300,238	326,099
Round timber	152,988	149,271	189,284	188,129	170,998	144,686
Pitprops	245,838	279,370	376,928	513,749	744,891	871,391
Other kinds	130,651	145,559	150,972	182,444	215,931	269,268
Total	**3,302,068**	**3,711,332**	**4,575,479**	**5,204,271**	**5,953,466**	**6,822,138**
B) *Specification.*						
Deals and battens	2,224,759	2,619,474	3,247,987	2,501,561	2,541,967	2,731,755
Boards				1,060,438	1,352,890	1,639,639
Planed boards				193,210	273,993	467,290
Deal and board ends	104,498	143,201	217,921	283,362	352,558	372,010
Beams[1]	251,526	210,645	202,287	103,279	75,774	67,953
Rafters	191,808	163,812	190,100	178,099	224,464	258,146
Timber, masts[2]	135,967	132,361	168,820	155,543	118,445	75,380
Spars and small timber	17,021	16,910	20,464	32,586	52,553	69,306
Pitprops	245,838	279,370	376,928	513,749	744,891	871,391
Staves	30,400	35,950	39,150	44,400	46,822	47,246
Sleepers	9,659	7,554	10,476	11,490	10,820	48,056
Fuel-wood	54,142	70,155	73,966	93,484	95,144	72,559
Other kinds	36,450	31,900	27,380	33,070	63,145	101,407
Total	**3,302,068**	**3,711,332**	**4,575,479**	**5,204,271**	**5,953,466**	**6,822,138**

The saw-blades are changed every time a new dimension is to be sawn. In this respect the large saw-mills have an advantage, as they can with more facility saw several dimensions at a time without needing to change frames so frequently. The old saw-blades were rather thick and had a long stroke, so that they consequently worked slowly and wasted much timber (about 10 %). On account of the raised prices of timber, and under the influence of competition, however, great efforts have been made to remedy these deficiencies as much as possible. The saw-blades are now made quite thin, and consequently they require a smaller »set« (the alternate inclination of the saw-teeth sideways), and give less saw-dust, but a smoother surface. — After the logs have passed through the frames and have been cut into boards, they are finished by *edging*, the boards being then passed between the two circular saws of the edging-machine.

The boards or **deals** are now arranged according to their different dimensions, and, where necessary, are sorted according to quality, after which they are run into the lumber-yard on trolley-cars and piled up in stacks to dry. The dimensions of sawn wood can vary between 12 in. (Engl.) by 4 in. all the way down to 1 in. by 1/2 in. The most usual kinds are *deals*, *battens*, and *boards*, which are also the largest dimensions; there are also scantlings, planchettes, fence-pales, glass-box boards, slatings, and *staves*, which are made in special stave-machines, from the waste accumulating in frame-sawing (laths and slabs).

[1] Of a thickness of 20 centimeters (8 inches) or more at the middle. — [2] Of a diameter of 25 centimeters (10 inches) or more at the small end.

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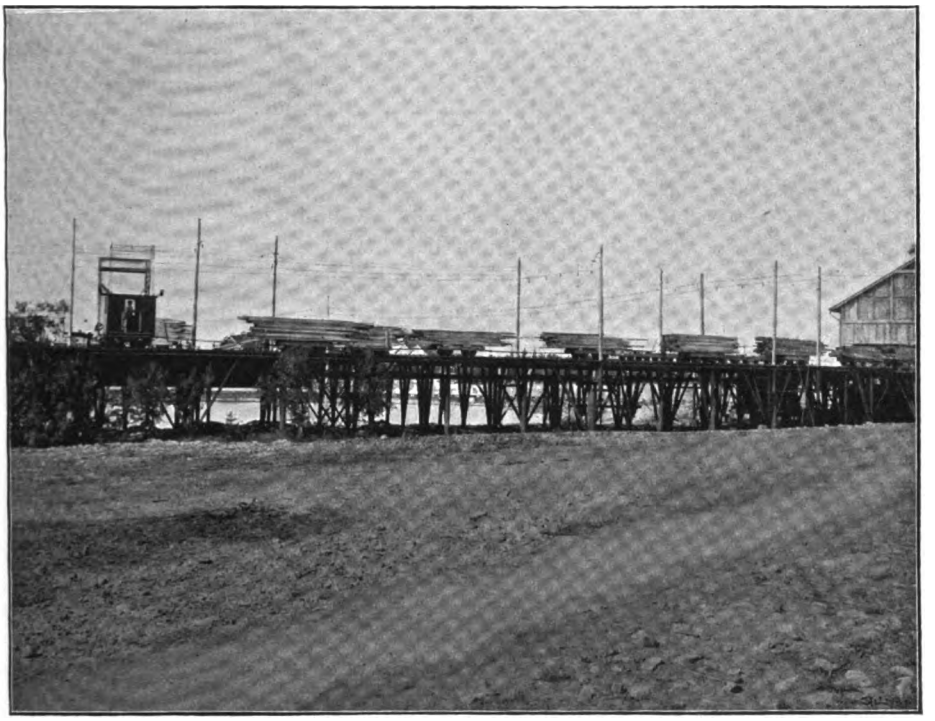
A good **quality** in the timber is characterized by its being sound and (as far as possible) free from knots, and by the wood being close-grained. This quality depends upon the shape which the trunk of the tree has had (a »pillar-shaped» tree gives the best timber), and upon the fact that it be cut before its growing capacity has essentially ceased. Many things may deteriorate the quality of the wood, e. g. »discoloured wood», which arises from fermentation of the sap; cracks or warping (»shakes»), which are caused by uneven seasoning, or else depend upon the tree being too old; and »wane», caused in sawing. — *Sorting* is a very important work, and the men who perform it, the *brackers* (klampare), receive higher wages than others.



Transporting to the lumber-yard.

In shipping sawn timber to *English*-speaking countries, a distinction, respecting quality, is made between mixed (a denomination properly signifying seconds, with a mixture of firsts), 3rds, 4ths, 5ths, 6ths (also called inferior 5ths), and »wrack» (wrack-refuse). For other markets, *French* sorting is used, i. e. prima, secunda, tertia, quarta, and quinta quality. (Thus thirds in the English classification correspond to secunda in the French). Whitewood is most frequently shipped unsorted.

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Value of unwrought timber exports, in 1871/98.[1]

The sorting is not quite the same in all shipping-districts. As an example we may mention the requirements made in Gefle for the best quality of deals (mixed): they must be entirely free from discoloration and worm-holes; there must not be more than four or five knots (in each deal); wane must not extend more than 18 in. (in length) and not be more than 3/4 in. breadth, and must besides only occur in a few of the deals. — Timber from Dalarne and Southern Norrland (»Lower Gulf») generally gives more first-class sawn wood than that from the »Upper Gulf», or the two northernmost Läns of Sweden.

The time during which the timber must lie and *season* is of varying length, depending partly upon the time of the year, partly on the kind of wood (whitewood seasoning quicker than redwood), and partly upon the country for which the sawn wood is intended; the wood to be shipped to the tropics needs to season longer than other wood. Also the wood intended for planing needs longer seasoning.

Before the wood is ready for shipping, it must also be given the desired *length*. It is true that the logs have, immediately after the felling of the trees, been cut into certain given lengths, but during the process of floating or in transportation, they have been damaged or worn in the ends; and therefore the logs are cut about 12 inches longer (wearing allowance) than the size to be carried in account. Besides, in case any blemishes, e. g. dryrot or wane, happen to occur near the end of a board, it is more advantageous to cut it off so as to get a somewhat shorter board of perfect quality besides a board (or board end) of inferior quality. Therefore the sawn goods are marked with a line across where they are to be cut off. After having

[1] In the years 1899, 1900, 1901, and 1902 resp. the corresponding figures were 140, 154, 132, and 149 million kronor. (A krona = 1·10 shilling or 0·268 dollar).

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TABLE 89. *Exports in 1900 of unwrought timber. By Custom-districts.*
Cubic meters à 35·32 cubic feet or 0·3532 register ton.

	Deals and battens.	Boards (also planed).	Beams and rafters.	Round timber.	Pit-props.	Other kinds.	Total. Cubic meters.
Norrland:							
Haparanda	131,771	56,787	29,723	9,290	—	25,083	**252,654**
Luleå	60,354	23,471	5,424	—	—	14,778	**104,027**
Piteå	102,484	22,574	5,189	—	—	20,062	**150,309**
Skellefteå	161,395	56,293	47,742	—	—	31,734	**297,164**
Umeå	132,909	119,666	2,495	784	2,401	49,101	**307,256**
Örnsköldsvik	113,413	84,673	1,642	3,390	26,251	33,447	**262,816**
Hernösand	374,990	271,191	5,200	45,336	48,273	81,626	**826,616**
Sundsvall	409,890	418,707	34,300	18,997	93,175	106,536	**1,081,605**
Hudiksvall	94,259	121,569	76,590	7,423	47,743	22,636	**370,320**
Söderhamn	256,290	223,417	806	—	15,496	60,533	**556,542**
Gefle	272,165	301,547	—	17	21,765	42,925	**638,419**
East coast:							
Stockholm	34,113	12,088	663	—	5,157	2,443	**54,464**
Vestervik	68,013	28,031	—	33	18,824	5,321	**120,222**
Oskarshamn	15,647	74,780	8,211	—	62,781	3,581	**165,000**
Kalmar	27,142	32,952	28,052	38	73,231	30,662	**192,077**
Other districts	157,891	60,963	2,936	49	53,439	50,238	**325,516**
West coast:							
Gothenburg	122,602	123,720	1,218	4,262	429,052	41,249	**722,103**
Other districts	43,163	106,822	95,954	25,854	207,191	57,304	**536,288**
Summary.							
Norrland	2,109,920	1,699,895	209,111	85,237	255,104	488,461	**4,847,728**
East coast	302,806	208,814	39,862	120	213,432	92,245	**857,279**
West coast	165,765	230,542	97,172	30,116	636,243	98.553	**1,258,391**
Total	**2,578,491**	**2,139,251**	**346,145**	**115,473**	**1,104,779**	**679,259**	**6,963,398**

thus been *adjusted*, they are cut off by means of a *cross-cutting saw*. This cross-cutting may be done by hand and is not infrequently done in that way, but at the large saw-mills, cross-cutting machines run by electricity are used, and electric feed-rollers, on which the boards are run automatically from the stacks to the cross-cutting saws.

Several saw-mills are connected with **planing-mills**, where the boards are planed and turned into floorings, mouldings, etc.

As will be seen by Tables 88 and 89, the principal **articles of export** among wood-goods are sawn products: *deals*, *battens*, and *boards*. Great Britain is the most important purchaser of these goods (see Table 91, page 664), and next comes France; among importing countries may further be mentioned Germany, the Netherlands, Belgium, Denmark, and South Africa. For planed boards, besides Great Britain, the Netherlands and Cape Colony are the most important markets; part of this article finds its way as far as Australia. In several of the countries of the European continent the import of planed boards is hampered by high duties. — *Firewood* (more properly termed deal and board ends, length $^1/_2$—$5^1/_2$ feet) consists of such serviceable pieces as are left after the adjustment in assorting. The quantity of course depends upon the

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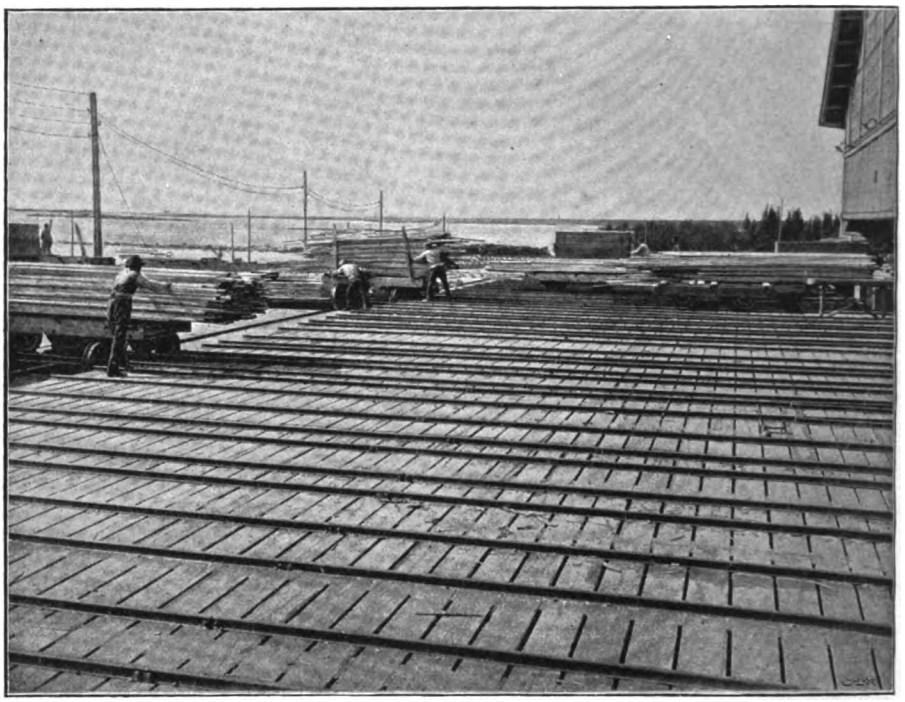
extent of the saw-mill business. The export goes principally to Great Britain, and a smaller portion to Denmark and France. Formerly deal-ends were chiefly used as fuel, but of late these goods are being used for making packing-cases, and the like.



Rail-system at a Saw-mill.

The export of *round timber* has long been stationary, or even receded somewhat. To this sort of timber belong Dutch timber or Dutch balks; the latter designation is improper — probably owing to the fact that, on shipping, two sides of this timber is slightly hewn at the butt end, partly for the purpose of calculating the dimension, and partly to make the balks lie more securely in place when loaded. Dutch balks of ordinary size measure 24 feet in length and 10 inches in diameter at the top; usually they are of white wood, seldom of red wood. The export goes to Holland, where the timber is afterwards generally sawn; sometimes it is used as piles and for building dams (now, however, poorer timber, such as dead wood and the like, is also used). The largest portion of this kind of timber is shipped from Sundsvall, a smaller portion from Hudiksvall, Hernösand, and the ports of the »Upper Gulf». The export of Dutch balks has decreased somewhat for two reasons: in the first place, the demand for

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TABLE 90. *Exports of timber from different parts of the country, in the years 1881/1900.*[1]

	Yearly exports, by cubic meters.[3]				In % of total exports.[2]			
	1881/85.	1886/90.	1891/95.	1896/00.	1881/85.	1886/90.	1891/95.	1896/00.
Deals and boards:								
Norrland	2,753,748	3,220,617	3,572,416	4,030,551	84·8	85·8	85·7	83·3
East coast	239,846	274,716	339,743	457,459	7·4	7·3	8·1	9·4
West coast	254,393	259,876	256,691	350,654	7·8	6·9	6·2	7·3
Beams and rafters:								
Norrland	318,347	199,411	197,792	187,228	81·1	70·9	65·9	57·4
East coast	32,116	43,890	47,816	39,283	8·2	15·6	15·9	12·0
West coast	41,924	38,077	54,630	99,588	10·7	13·5	18·2	30·6
Round timber:								
Norrland	181,383	183,821	154,605	110,562	95·9	97·8	92·6	76·4
East coast	1,538	533	1,086	1,484	0·8	0·3	0·6	11·0
West coast	6,324	3,583	11,338	32,640	3·3	1·9	6·8	22·6
Pitprops:								
Norrland	7,585	36,620	161,189	213,021	2·0	7·1	21·7	24·5
East coast	87,077	130,232	144,732	165,135	23·1	25·4	19·4	18·9
West coast	282,266	346,897	438,970	493,235	74·9	67·5	58·9	56·6
Total.								
Norrland	3,261,063	3,640,469	4,086,002	4,541,362	77·5	76·8	75·9	73·5
East coast	360,577	449,371	533,377	663,381	8·6	9·5	9·9	10·7
West coast	584,907	648,433	761,629	976,117	13·9	13·7	14·2	15·8
Sum of above	4,206,547	4,738,273	5,381,008	6,180,860	100	100	100	100
Other timber	368,932	465,998	572,458	641,278	—	—	—	—
Sum total	4,575,479	5,204,271	5,953,466	6,822,138	—	—	—	—

them in the Netherlands has diminished since a large quantity of planed boards have begun to be imported into that country, and further, the supply of the raw material has decreased, as the forests have come into the hands of the great saw-mills, whose owners, for natural reasons, prefer another use for the timber.

For heavy *beams* (balks), old, over-ripe trees are taken preferably, and as the supply of these is decreasing, the amount exported has also diminished considerably; the competition in price with American pitch-pine has also contributed to this. On the other hand, the export of *rafters* and small balks has at least retained its former standard. Among countries with a market for rafters, we should mention, besides Denmark and Germany, Egypt, where rafters of small dimensions are used for roofing the Arabian huts. About ten years ago, these Alexandria rafters, as they are called, were taken from the Austrian ports on the Adriatic, but now from Sundsvall. — Rafters are exported from most of the Norrland ports, as well as from Kalmar and Halmstad.

[1] Concerning the extent of the three districts here separately treated, see Table 89. — [2] Of each article by itself. — [3] A cubic meter = 35·32 cubic feet.

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TABLE 91. *Exports of unwrought timber to different countries, in 1900.*
Cubic meters à 35·32 cubic feet.

To	Deals and battens.	Boards (also planed).	Beams and rafters.	Round timber.	Pit-props.	Other kinds.	Total. Cubic meters.
Norway	9,134	625	212	1,977	312	1,747	14,007
Denmark	36,721	273,844	92,180	21,671	85	123,452	547,953
United Kingdom	1,316,660	659,170	39,432	6,364	1,094,552	504,789	3,620,967
Netherlands	248,075	228,584	19,213	78,956	4,365	12,184	591,377
Belgium	40,407	132,208	8,297	—	5,461	15,857	202,230
German Empire	166,280	427,995	79,257	3,493	4	15,477	692,506
France	517,982	301,222	34,063	1,213	—	3,286	857,766
Egypt	22,589	17,473	64,236	—	—	865	105,163
The Cape	84,973	37,441	253	118	—	495	123,280
Other countries	135,670	60,689	9,002	1,681	—	1,107	208,149
Total	2,578,491	2,139,251	346,145	115,473	1,104,479	679,259	6,963,398

Railway-sleepers are now turned out in large quantities at the saw-mills of the southern provinces. The export, which of late years has greatly increased, goes principally via Gothenburg to Denmark and England.

A branch of the timber business which has long been regarded with a certain displeasure or suspicion, is the export of *pitprops*. The displeasure is naturally caused by the fear of forest exhaustion, and this fear is by no means groundless. The cutting of pitprops would have no injurious effects, if for this purpose were used only such undersized trees, which, from a rational sylvicultural point of view, are to be condemned; but it is most destructive when, as is often the case, entire sections of young timber are mown down wholesale. The main part of the pitprop exports is from the South of Sweden, from which most of this timber originally comes; but from Norrland a constantly increasing export is also taking place. This article goes almost exclusively to England.

Pulpwood is principally shipped from Gefle and Söderhamn and goes to Great Britain, France, and Denmark.

The export of *staves* and *headings* (both of deciduous wood and of red and white wood) shows considerable fluctuations from year to year but, on the whole, it has remained stationary. Competition with the Finland article has contributed to counteract the development of this trade and, besides, from some places the demand has decreased, because in certain industries barrels have been supplanted by casks of sheet iron. The principal center of export for staves is the Hernösand district.

Among *other kinds* of unwrought timber, we may here briefly mention only lath and trellis-wood, which is almost exclusively shipped to England, and wood for fuel, which is principally exported from our most southern ports to Denmark.

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From the point of view of **value**, the largest items of our timber exports, in 1900, were: deals and battens, amounting to 73·74 million kronor, and boards, valued at 53·34 millions; these two articles together thus totaling 127·08 million kronor, or 82·7 % of our total export of unwrought timber. Next follow pitprops with 11·21 million kronor; beams and rafters with 6·54 mill.; board and deal ends with 3·01 mill.; round timber with 2·34 mill. kronor; mouldings, laths, and ribs with 0·95 mill.; staves with 0·81 mill.; sleepers with 0·65 mill.; other articles together 0·84 mill. Total 153·75 million kronor. (A krona = 1·10 shilling or 0·268 dollar).

In the Lumber-yard.

A considerable export of timber goes over land to *Norway*. Formerly the Swedish statistics have in this respect been very incomplete; thus, in 1900, the value of the exports of unwrought timber to Norway should amount only to about 330,000 kronor, while according to the Norwegian statistics it amounts to 5,700,000 kronor. From 1902 inclusive the Swedish statistics also are fully reliable on this point. This latter year the stated value was 5,626,000 kronor.

In the above quantities and values is not included the timber *floated* from Sweden to Norway. According to a calculation made by I. Flodström, the quantity of this timber has averaged, yearly, in 1891/95, via the following rivers: Enningsdalselfven 5,400 cubic meters, Tistedalselfven 48,500, and Flisenelfven 35,000, or altogether 88,900 cubic meters.

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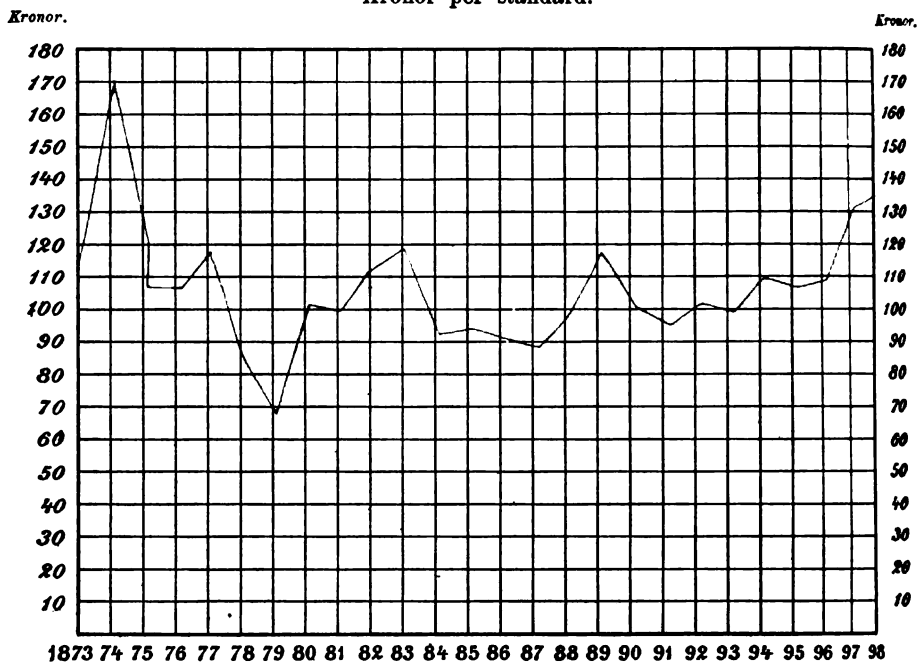
Prices at Sundsvall of Fourths red battens 2½" × 7", in 1873/98.

Kronor per standard.[1]



On the other hand, the quantity of timber floated from Norway to Sweden, is stated as amounting to about 138,200 cubic meters yearly, of which 108,800 come by the water-courses of the Klarelfven, 9,000 by the Byelfven, and 20,400 by the rivers Indalself and Faxelf.

In regard to the **prices of timber,** statements are certainly given in our commercial statistics, but it is difficult to summarize these statements as to the different kinds, so as to give a distinct idea of the fluctuations of price. Instead, we here give a diagram for one of the most important kinds, namely fourths in red battens, which will no doubt give a pretty faithful idea of the average rise or fall. Here it should be noticed that the supply of different kinds of timber of heavy dimensions and of superior quality has decreased. If this were not the case, the average price of sawn goods, during the last years, would have risen more than the diagram shows, because most articles have risen in price more than red battens; in some cases the prices have even exceeded those of 1874, which hitherto were considered the maximum rates.

The import of unwrought timber (when the timber floated from Norway is not taken in account) is insignificant in comparison to the export (compare Table 86, page 639) but it is increasing on the whole. The

[1] In 1899, 1900, 1901, and 1902 the corresponding prices were resp. 138, 150, 147, and 131 kronor per standard. (A krona = 1·10 shilling or 0.268 dollar).

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value of the same, in 1900, amounted to 4,407,000 kronor, and the quantity was 308,000 cub. meters.

The principal sorts of imported timber of *native kinds of wood* are timber and spars of different dimensions, and fuel-wood, especially birch, coming almost exclusively from Finland. Large quantities of timber from northernmost Finland are conveyed in immense rafts, being towed by steam-tugs specially adapted for the purpose, across the Bothnian Gulf, to the saw-mills in the vicinity of Sundsvall. Unwrought *foreign kinds of wood* are besides imported (in 1900 the value amounted to 207,000 kronor), of which the greater part comes via England and Germany.

By-trades in forestry.

Sweden's vast forests and highly developed timber trade give ample opportunity to a number of by-trades, but as it is generally the tendency of our people to overlook the *small* gain, such is the case here also. It is true that of late these products of the forests have been taken care of far more thoroughly than before, but a lot of waste-timber is still left to rot in our forests, and many a by-trade connected with forestry, has up to date not been started or only leads a languishing life.

The most important of the, so to say, lesser industries of forestry is without doubt the preparation of **charcoal,** which subject is thoroughly treated in the following under the heading Mining.

In olden times, the preparation of **tar** was a considerable industry in Sweden and wood-tar one of the most important export articles of our country. The export mostly went over Stockholm, and the Stockholm tar was considered the best. Nowadays this manufacture is principally confined to the two northernmost läns; the chief place of export being Umeå. Concerning the imports and exports of tar and pitch during later times some dates are given in Table 92. The manufacture of tar is effected either in open so-called tar-hollows (illustra-

TABLE 92. *Imports and exports of tar and pitch.**

Average for the years	Tar. Quintals.		Coal-tar. Quintals.		Pitch. Quintals.		Total value. Kronor.	
	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.
1871/75	17,159	83,148	5,942	48	1,551	1,418	173,000	1,069,000
1876/80	14,873	70,437	16,181	392	2,248	1,610	278,000	896,000
1881/85	9,400	83,412	24,880	1,826	3,950	727	287,000	1,245,000
1886/90	11,995	54,270	20,296	12,042	2,995	803	236,000	673,000
1891/95	17,169	57,991	16,217	21,317	2,274	982	276,000	756,000
1896/00	17,640	40,185	28,580	26,103	8,077	598	387,000	541,000
In 1900	17,189	35,873	33,033	8,281	7,827	1,210	406,000	505,000

* A quintal = 1·97 cwts = 220 lbs. A krona = 1·10 shilling or 0·268 dollar.

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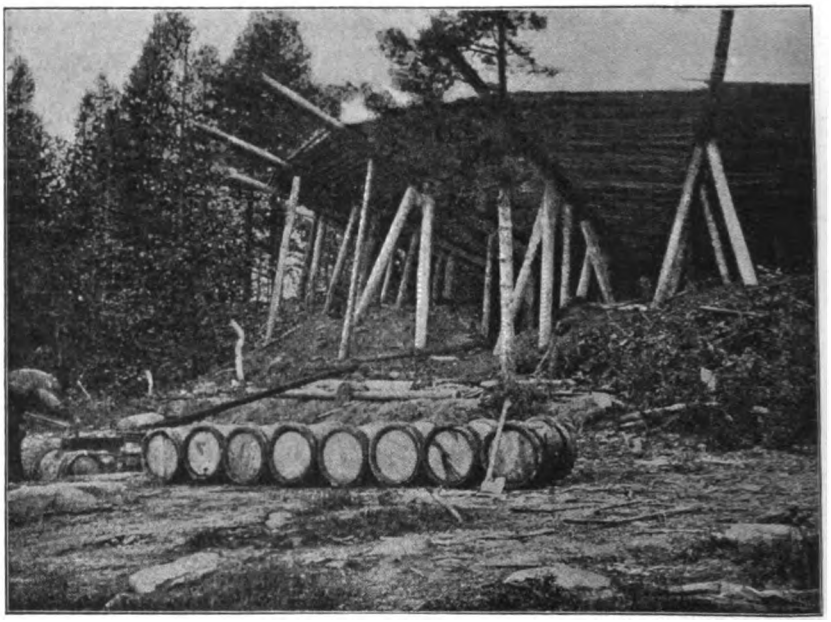
tion below) or in so-called tarring-furnaces. Besides, there are some smaller establishments for production on a large scale.

The manufacture of **potash** has decreased considerably; it even appears to be going to cease altogether.

As a by-trade of forestry, **peat-digging,** with thereunto belonging industries, is sometimes counted, which, however, is scarcely correct. Now-a-days peat-manufacture has developed to an independent trade of great importance, with still greater possibilities for the future. An account of the present position of this question is given in the following under the heading: The manufacturing industry.



Tar-hollow.

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VIII.

SHOOTING AND FISHING.

1. SHOOTING AND SHOOTING LEGISLATION.

In ancient times, shooting and fishing were the chief sources of support for the inhabitants of the North, but after cattle-breeding became common and the soil began to be tilled for necessary food-products, shooting was no longer a necessity for the support of life, but was diligently practised, partly as a valuable by-trade, and partly to protect the herds from beasts of prey, besides being highly prized as a manly sport.

Game, which was at that time very plentiful, was considered as »belonging to nobody», and shooting could be freely practised everywhere and anywhere. With the gradually progressing culture and the consequent decrease of game, legislation began to make restrictions in every-one's right to free shooting, and the owners of land were ascribed sole right to shooting on their own land, with the exception of beasts of prey, which could still be pursued and killed by anybody and anywhere. But in course of time the idea became prevalent that the right to shoot even on private ground belonged to certain privileged persons, and on the issuing of the Royal Statute of Aug. 29, 1664, the landowning peasants almost entirely lost all right to kill or catch game not reckoned among beasts of prey. Only by the Royal Ordinance of Feb. 21, 1789, more minutely confirmed by the Royal Statute of April 13, 1808, the right of landowners to shoot on their own ground was re-established.

The game-law now in force, issued Oct. 21, 1864, also recognizes as its main principle the right of the landowner to shoot on his own ground, but if the land is let to anyone for tillage, the right of shooting on it goes to the leaseholder, unless otherwise agreed.

This shooting right which is ascribed to the owner or leaseholder of land, and which he is entitled to make use of without paying any dues whatsoever either to the state or community, is restricted, however, by the common regulations which have been or may be issued for the protection of useful game during certain times of the year. These closed times may, after petition, or in consequence of some other reason, be protracted or restricted by the King, while the regulations of the game-law can be altered only after hearing the Riksdag on the subject. For this reason, the regulations in regard to closed times

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vary somewhat in different parts of the country, but, as a rule, the following **closed times** are at the present in force: — for *elk*, the whole year except from 1st to 15th September; for *stag*, from 1st December till 16th August following; for *fallow deer* and *roe* from 1st of January to 1st of September; for *hare*, *wood-grouse*, *black-game*, *hazel-grouse*, *low-land and mountain ptarmigan*, in the läns of Norrbotten and Vesterbotten, from 16th March to 21st August, in other parts of the Kingdom, from 15th February to 16th August; for *partridge* from 11th November till 11th September following; for *woodcock*, from 1st February till 11th May; for *swan*, *duck* (genus: Anas) and *snipes*, from 1st January till 21st July; for *poachard* (genus Fuligula), in fresh water, from 16th March till 21st July, on the sea-coasts from 24th April till 1st August; for *eider*, on the east coast, from 24th April till 1st August, on the west coast, from 1st February till 1st September, besides which several special regulations apply to this bird.

Bear. Painting by BRUNO LILJEFORS.

Useful game is thus protected by law, not only during breeding-time, but also till the young have become sufficiently large both to be useful for food and capable of escaping from the pursuit of the hunter. Nevertheless it must be admitted that the supply of useful game is not as plentiful as the care that legislation devotes to it would give reason to suppose. The causes for this are doubtless to be sought partly in climatic influences, which frequently have a bad effect on the development of the year's breed, partly in an immoderate shooting on grounds cut up by the continually progressing partition of land,

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where every one who has the right of shooting takes what he can get at, without any thought of the preservation of the game-stock, partly and finally in an abundance of injurious animals which eat the young and eggs of the useful game. Larger game, such as *elk* and *deer*, seem, under the protection of the law, rather to increase than to decrease. What greatly contributes to this is doubtless the fact that the worst enemies of these animals, among large beasts of prey particularly the *wolf*, the *lynx* and the *glutton*, are diligently hunted wherever they show themselves, thanks to ample reward paid out by the public treasury for their killing, and are gradually compelled to retire more and more to the wood and mountain wildernesses in the northwestern parts of the country. To encourage the extermination of smaller injurious animals, as *fox*, *hawk*, *great-owl* and *crow*, etc., premiums are paid in most parts of the country by County Councils, by Agricultural Societies, associations for preservation of game, or by communities, but the number of these injurious beasts and birds is nevertheless still considerable, and certain kinds, such as the *fox*, seem to be on the increase. To illustrate the effect that the aforesaid reward for shooting beasts of prey can have, it may be mentioned that, according to official statistics, there were killed throughout the country in 1900, 11 bears, 55 wolves, 32 lynxes, 111 gluttons, 23,649 foxes, 572 martens, 21 otters, 855 seals, 259 eagles, 1,010 great-owls, 11,930 hawks, and 115,396 crows, for whose killing there was paid out in reward 5,161 kronor by the public treasury and 65,410 kronor by the aforesaid corporations and others.

For the sake of comparison it may be mentioned concerning the larger beasts of prey that while, during the decennium 1851/60, there were annually killed on an average: 124 bears, 180 wolves, and 156 lynxes, during the period 1896/1900, there have been killed on an average only 10 bears, 86 wolves, and 43 lynxes (see Table 93), which kinds of animals are thus obviously on the decrease, although the wolf has of late years shown a tendency to increase in the mountain districts. — With regard to useful game there are no statistics to be had. Only concerning the *elk* informations have, through the organ of the Swedish Hunters' Association, been collected during a series of years from the State foresters, from which is seen that 1,500 to 1,600 elks are annually killed in the country during the lawful shooting-season.

TABLE 93. *Number of Beasts of prey killed.*[1]

Years.	Bears.	Wolves.	Lynxes.	Gluttons.	Years.	Bears.	Wolves.	Lynxes.	Gluttons.
1856/60.....	635	868	868	611	1881/85.....	160	171	128	594
1861/65.....	532	556	679	546	1886/90.....	163	143	99	447
1866/70.....	494	236	525	695	1891/95.....	124	359	175	544
1871/75.....	259	229	536	506	1896/00.....	51	429	216	922
1876/80.....	299	183	334	646					

[1] Totals for the quinquenniums, not averages per year. The number of *foxes* killed during the same periods amounts to resp. 52,327, 69,599, 63,206, 40,965, 58,749, 76,552, 76,710, 92,683, and 106,965.

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Taking a survey of the occurrence of useful game in the country, one finds that the *elk* occurs more or less numerously in most of the provinces from the North of Skåne up to Norrbotten and seems to be inclined to spread even to the territories where at present he has not a fixed resort. Among the other cervidæ, the *wild reindeer*, formerly numerous in the mountain districts, has about entirely disappeared from the fauna of the country. The *stag* only occurs within a very restricted region in the South of Skåne. The *fallow-deer* is preferably kept within fenced deer-parks, among which may be mentioned the royal park at Gripsholm, and on some large estates in Skåne, although exceptionally it occurs in wild state in some parts of last mentioned provinces; the *roe* is rather numerous in the southern parts of the country and shows a disposition to extend northward. Among other mammals, the *hare* is the game which is the most general object of hunting. In a large portion of the country it is hunted by help of harriers, and this manner of hunting should doubtless be regarded as the most national and the most typical for the country.

Wood-grouse. Painting by Bruno Liljefors.

Among the rasores, the *wood-grouse*, the *black-cock*, the *hazel-grouse*, the *ptarmigan*, and the *partridge* are those most pursued by the sportsman. They occur, according to the nature of the ground more or less numerously, the woodgrouse and the hazel-grouse preferably in the backwoods, the black-cock in forest as well as pasture-grounds, and on the heath, the ptarmigan only in the mountain districts, and the partridge on cultivated plains. Among wading birds, the *wood-cock* is highly estimated as game. She breeds in most provinces where damp woodland is to be found, but is decreasing in number, in spite of the fact that Sweden is one of the

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few countries, where this beautiful bird is protected by law, during part of the breeding time. This is also the case with the *common snipes*, which, through the continual drainage of the bog-lands lose suitable breeding-places. Among swimmers the *mallard*, with respect to hunting, is doubtless the most important, and it occurs in varying numbers both in the interior and along the coast. On rocks and cliffs in the sea, as also in mountain lakes and rivers in Norrland, several species of *poachards* breed, which like the mallard are migratory birds and during their flights in autumn and spring along our coasts are keenly pursued by the coast-population, who also exact heavy tribute from other swimmers dwelling on the coasts.

From an *economical* standpoint, the shooting is not nowadays of the same importance as before, when the supply of game was richer. Only few of the inhabitants of the country might now be able to make a living out of hunting. In the Lappdistricts of the Läns of Norrbotten and Vesterbotten and in the Län of Jemtland, where the catching of forest birds and ptarmigan by help of traps and snares still is permitted by the law, the poorer population may be able to obtain a considerable contribution to their livelihood. Considerable quantities of birds obtained in this way are annually exported in frozen state from these regions to more southern parts of the country. The hunter who succeeds in killing an elk or two in the year, can also be said to make a good profit, as a grown up elk has a value of 75 to 100 kronor. That the coast-population can gain an income out of sea-fowl is mentioned above. For the rest, only a comparatively small profit will be gained by the individual out of shooting as long as the gamestock is kept on the low level to which it has sunk by and by in the more densely populated parts. The shooting is, however, of no mean value to the landowner, inasmuch as well-to-do *enthusiastic sportsmen* for their own pleasure more and more seek to obtain the right of shooting on adjoining land areas, against payment of so-called shooting-rents. What the landowner cannot gain by his own shooting, he can thus, through letting out his shooting, obtain to an amount often considerably higher than the game, existing on his grounds really represents.

Though the shooting thus for the individual can be said to be of comparatively inferior importance as a source of gain, still the game killed in the whole country represents a considerable capital, which is well worth administering in a practical way. Only the elks killed each year have a market-value of nearly 150,000 kronor, which capitalized after 5 % makes the considerable amount of 3 million kronor. In all probability the value of the quantities of forest birds, ptarmigan, partridges, sea-fowl, and hares which are annually killed, amounts to still larger sums. As the game, besides, makes a healthy and nourishing food, which is highly estimated for its excellent taste, and as the shooting is a strengthening and hardening sport for the growing generation, all seems to indicate that one ought to pay such attention to the game, that not only its decrease be prevented but much rather its development advanced. The interest for an improved preservation of the game is also steadily increasing, and the desideratum of the shooting is encouraged by numerous hunters' associations and unions for the protection of game, which have coalesced for mutual collaboration under the name of the Swedish Hunters' association. A new game-law, worked out by a special committee under the supervision of H. R. H. the Crown-prince, has also been submitted to the consideration of the Riksdag, though as yet without success.

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2. FISHING.

The natural qualifications of Sweden, surrounded as it is to a large extent by the sea, and with innumerable lakes scattered in its interior, invite the inhabitants to take a considerable portion of their living from the waters. It is true that the increasing cultivation of the country and its industrial development, as well as the great value which its vast forests now have compared with their former value, have caused fishing not to be of the same importance nowadays as it once was for the few and scattered inhabitants of former days. But to this very day fishing has a considerable value as a source of livelihood. With regard to *the returns of the Swedish fisheries* we have as yet only scattered and very deficient informations. According to an approximate estimation for the period 1891/95, the annual value should, however, have amounted to about 9 million kronor, of which 4 million come from the coast-fisheries, 1·5 from the high-sea fisheries, and 3·5 million kronor from the freshwater fisheries (including salmon and eelfishing). The herring-fishery was calculated to give 2,750,000 kronor, the smallherring-fishery 1,000,000, lobster and oyster fishery 175,000, the salmon fishing 950,000, and the eelfishing 600,000 kronor. According to a more recent estimation by the Fishery Inspector F. TRYBOM the salt-water fisheries alone (Coast and high-sea fisheries) yielded in 1902 fully 7 million kronor. Concerning the import and export of fish, informations are given in Table 94. — About 40,000 people live exclusively on fishing, and it also constitutes a more or less considerable by-trade, both for the coast-population and for the agricultural population in the interior of the country.

The Baltic, which washes the east and south coasts of Sweden, is an inland sea containing predominatingly cold water with a slight percentage of salt decreasing from south to north and, in the Gulf of Bothnia as well as in the inner bays and fiords of the Archipelagoes, being only minimal. The salt-percentage of the water increases, however, from the Kattegatt northward and is in the Bohus Bay, the water of which stands in more direct connection with the North Sea, about the same as in this sea. A natural consequence of the aforesaid fact is that the number of salt-water fishes is considerably greater than in the Baltic, where they represent a minority and decrease in number towards the north in relation to the decreasing salt-percentage of the water. But in the Baltic there is another remarkable circumstance, namely that along the coast, and especially in the archipelagoes pure fresh-water forms occur in equally great or greater numbers than the salt-water species. Thus, of our about 40 kinds of fresh-water fish, no less than 30 species are also to be found in the Baltic, and part of them are a source of lucrative income to fishermen. Another circumstance also affecting the fishing, is that a large portion of our coast is bordered by a fringe of innumerable larger and smaller islands and rocks forming a so-called »Skärgård».

A consequence of these circumstances is that the difference between salt-water and fresh-water fishing is less marked in Sweden than in countries surrounded by salter seas, and that furthermore, the fishing is chiefly *coast-fishing* and less *open*

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sea fishing. Furthermore, in comparing the fisheries of Sweden with those of other countries, it is worthy of notice that with us the boats and fishing-tackle are owned by the fishermen themselves, the members of the crew being part-owners in the boat or vessel, and the profits being divided according to the shares owned, after a certain portion has been deducted for keeping the boat in repairs; thus, there are no crews hired by ship-owners or companies to be found.

Salt-Water Fishing.

Herring (Clupea harengus) and **small herring** (Clupea harengus, var. membras L.) are the most important of all our species of fish. Herring-fishing in Bohuslän attracts the greatest attention, both on account of the great extent which it reaches at certain times and also because of the peculiar circumstance with respect to the appearance of the herring, which has been characteristic as far back as history goes. The herring has, namely, after having appeared along the coast and entered the fiords for several decades, for long periods ceased to enter the Bohus archipelago, where during these interims only the ordinary coast herring has appeared and then only in small numbers in comparison with the rich fishing years. Such a period of rich herring-fishing on the Bohus coast began in 1877 and has continued up to the last few years when the fishing often has failed. Whether this implies that the »herring-period» is for this time approaching its end or whether it is to be ascribed to occasional and transient causes, is at present undecided. With reference to Table 94, informations are given below as to the quantities of exported *fresh fish* (of which the greatest part consists of herring) for every year of the herring-period in question. The export was:

In	Quintals.	In	Quintals.	In	Quintals.	In	Quintals.
1877	227	1884	20,252	1891	681,278	1898	396,691
1878	9,536	1885	120,965	1892	907,022	1899	226,344
1879	4,300	1886	221,313	1893	773,848	1900	44,778
1880	11,162	1887	340,960	1894	1,001,344	1901	102,790
1881	20,346	1888	391,441	1895	816,090	1902	51,719
1882	45,811	1889	558,069	1896	677,232	1903	75,000
1883	43,019	1890	678,184	1897	229,507		

The herring has been caught partly in seines in the inner fiords, partly in setting-nets. Early in the autumn (August—October) much herring is caught in drift-nets along the southern coasts of Bohuslän and Halland. In September—October fishermen from Skåne and other provinces also fish herring with drift-nets in the southern part of the Kattegatt and in the Sound, as well as fishermen from Skåne and Blekinge throughout the whole summer in the southern part of the Baltic. The same kind of fishing is also carried on during summer around the island of Gotland. In the bays and fiords of the archipelago along the coast from Blekinge northward, herring and small herring are fished with drag-nets principally during spawningtime in spring and the early part of summer; in some places in Central Sweden, also during winter under the ice with very large drag-nets, so-called winter drag-nets. Besides, there is used a special kind of herring-nets called standing-nets, which along the Norrland coast are tied very deep and are turned inward in the shape of a hook and are called »hook-nets» or »deep-nets». Also fykes are used for fishing small herring in certain parts on the Norrland coast.

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TABLE 94. *Imports and exports of fish.* In Quintals à 1·97 cwts.

Average for the years	Fresh fish.		Herring, salted.[1]		Anchovy, sardine, tunny.		Other.	
	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.	Imp.	Exp.
1866/70.....	1,032	277	244,070	1,784	18	12	32,778	1,074
1871/75.....	1,274	851	285,836	7,090	89	210	37,545	2,328
1876/80.....	2,324	5,140	222,629	18,950	778	1,014	42,983	2,743
1881/85.....	6,453	50,079	260,225	45,755	3,380	898	35.116	5,952
1886/90.....	8,719	437,993	265,027	105,912	6,901	890	38,833	5,938
1891/95.....	14,162	835.916	307,289	328,583	14,321	966	39,240	6,433
1896/00.....	21.198	314,911	396,687	123,834	21,289	458	43,460	4,956
In 1900.....	33,870	44,778	403,930	44,738	22,619	57	55,044	4,629

Herring is nowadays to a large extent sold fresh, partly for export, especially to the German smokeries from Bohuslän, Halland, and Skåne, and partly for home use. In years when the herring fishery is good, large quantities of herring from Bohuslän which are not found worth to be salted are used in preparing guano and herring oil. The best herring is salted and principally exported. This business has, however, by far not been so profitable as it might in case of a better arranged market.

Small herring (var. membras) is, when fresh, a delicious fish, and even when salted it constitutes an every-day article of food among the population in Central and Northern Sweden. Small herring is also used when smoked (bloater).

The real *anchovy* (Stolephorus encrasicholus) only rarely occurs in Swedish waters, but the other species of herring, the sprat (Clupea sprattus), occurs both along the west and the east coast, and is prepared, in Bohuslän, in the salted and spiced form which, in tins labelled »ansjovis», has found a very extensive use both at home and abroad.

Among the **cod** family (Gadidæ) the following species are objects for considerable fishing: the cod proper, the haddock, the whiting, or merling, the ling, and the hake. The *cod* occurs all around the coast all the way up towards Norrland, although in decreasing number, but is not so very extensively fished in our country as in Norway, although codfishing along the west and south coast all the way up to Gotland does not lack importance. The other species above mentioned only belong to the west coast.

Among the **flounders,** the *plaice* (Pleuronectes platessa) is the most important, together with the *turbot* (Bothus maximus), the *sole* (Solea vulgaris), and the common *flounder* (Pleuronectes flesus), which occurs even in the Baltic as far up as the Gulf of Bothnia. The shallower parts of the Kattegatt are the principal fishing-places for the said species, while the *halibut* (Hippoglossus vulgaris) belongs to deeper water in the Bohus Bay. The inhabitants of Skåne carry on a lucrative plaice fishing in the Kattegatt with cauffishing boats, so-called »kvassar», for sale chiefly on Copenhagen. From southern Bohuslän a lucrative fishery of this kind is now carried on in Kattegatt. For this fishery

[1] Inclusive herring — pickled, dried and smoked — and also small herring, etc.

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seines according to Danish usage and petroleum motors in the cauf-fishing boats are more and more coming into vogue. The inhabitants of Bohuslän go on open sea-fishing or so-called *bank-fishing* in the North Sea, the Jutland bank, and off the southwest coast of Norway, as well as north of the Shetland Islands and, exceptionally, up to Iceland. In this kind of fishing, they now principally use cutters of English model, but partly also the oldfashioned »bank-sloops» of 30—40 tons burden, and with a crew of 8—10 men. The fishing is done from the anchored vessel with great long-lines, so-called »storbackor», baited for ling, cod, halibut, etc. One or usually more trips are made during spring and summer, during the latter part of which the occupation is *mackerel fishing* in the North Sea and the Bohus Bay.

Lobsters and **oysters** are only caught on the west coast, where oysters occur about as far south as Marstrand and northward from this place.

The two very important species of fish, salmon and eel, belonging both to salt and fresh water, are treated under: »Fresh-Water Fishing».

Fresh-Water Fishing.

Sweden is very rich in larger and smaller lakes, and, in this respect, in relation to its area, takes the second place among European countries. Sweden also has about 40 **salmon-rivers** with a total length of 9,000 kilometers, of which a length of 3,700 kilometers is accessible for the salmon. The largest salmon-rivers are: the Torne elf, Kalix elf, Lule elf, Ume elf, Ångermanelfven, Indalself, Ljungan, Ljusnan, Dalelfven, and Klarelfven with its continuation the Göta elf; the following are smaller salmon-rivers: the Halland rivers, Viskan, Ätran, Nissan, and Lagan, and on the east coast, Mörrumså and Emå. Salmon not going to sea also occurs in the great lakes as Venern, Vettern, Siljan, and Storsjön in Jemtland. In the rivers salmon is caught in nets and seines, and, salmon going up from the sea, in salmon-traps of many different kinds. The largest salmon-fisheries are those at Elfkarleby in the river Dalelfven, at Mörrum in the river of the same name, and in the river Lagan. Of late one has endeavoured more and more to fish the salmon along the coast near the mouths of the rivers. Furthermore, in spring and late autumn considerable salmon fishing is carried on with salmon drift-nets in the Southern Baltic all the way down towards the German coast and some years around Gotland by fishermen from Skåne, Blekinge, and Gotland.

Fishing for **eel** is very lucrative, especially in the rivers when it is migrating down to the sea, and still much more along the coast in suitable places. Especially on the southeast and south coast there is rich eel-fishing close to land with a kind of fykes called »hommor» from

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Salmon Fishing at Elfkarleby. Photo. Fr. G. Klemming, Stockholm.

September till October or November, when the eel wanders along the coast out of the Baltic. German fish-merchants keep special cauf-vessels stationed along the coast and buy up eel for export to Germany.

Among other inland-lake fishes which are important for the fisheries, we may mention the *pike* and *perch*, very common, the *pike perch*, which occurs to a more limited extent but fetches a high price, the *burbot* (Lota), and among the Cyprinidæ, the *bream*, the *ide*, the *roach*, etc. Among the species of the Salmonidæ, the *trout*, the *gwyniad* and the *vendace* are of importance to the fisheries, especially in the north, and even the *charr* and the *grayling* are fished. Other fresh-water fishes are of inferior importance to the fisheries.

Fish Culture.

Sweden is, as far as we know, the only country in Europe where attempts have been made to promote the spawning of the common inland lake fish by means of special contrivances with the intention of improving fishing. As early as 1761, the Mayor of Linköping, *K. F. Lund*, published in the »Proceedings of the Royal Academy of Sciences» an essay called »On the Planting of Fish in Inland Lakes», in which he gave account of a method for hatching out perch and other inland lake fish (not salmon) in caufs lined with twigs. His attempts were afterwards

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forgotten until about 1850, when attempts at fish-culture were again begun, and it was not until 1865 that a complete institution for salmon-cultivation was established at the expense of the State, which »normal institution» afterwards became a pattern for a large number of such institutions throughout the country, of which there are now about forty.

Fish culture in ponds was carried on in ancient times at the monasteries and on many large estates, especially in Skåne, where the *carp* was introduced from Denmark in the beginning of the sixteenth century, but these ponds were afterwards neglected. The culture of carp has not been re-begun until later years, and at Gustafsborg in Skåne there is a large number of carp-ponds on the German model, built in 1879 and following years. From these ponds about 20,000 kronor worth of carp was sold in 1896, principally to Germany. The carp can, however, thrive as high up in the north as Vermland, where there are carp breeding-ponds at the Långbanshyttan Works. In 1890, there was founded at Finspång in Östergötland a »*Fish-cultivating and Fresh Water Biological Institution*» with small ponds, with the purpose of making an experimental station for fish culture in ponds and for fresh water biological researches. At Engelsberg, in Vestmanland, a stock-company for carrying on fish-culture in ponds has founded large hatcheries, principally intended for the propagation of trout, especially a species imported from America (Salmo irrideus), and other salmon-like fishes.

Fishery Legislation.

In regard to the ownership of fishing-waters there were provisions made already in our oldest laws and in the Common Law of 1734, but laws for the protection of fish were not made until late in our country, namely only by the »Common Fishery Law» of 1766. The Fishery Law now in force is of October 17, 1900. The provisions in regard to right of ownership have, however, now been separated from this law and arranged in a special »Law concerning the Right to Fishing Waters», of June 27, 1896.

The State nowadays owns only few fisheries. The majority belong to private persons, according to the common rule that the owner of the shore also owns the water and the fishing outside it; but in the villages not »re-parceled» (see p. 511) this right to the shore is only applicable to the villages themselves, while the separate partowners in the village have the same mutual fishing right within the territory of the village, disregarding the share each owns in the shore. The shore ownership extends, in lakes, streams, and the bays and fiords of the archipelago, to the boundary-lines. On the open sea-coast and in the largest inland lakes, the shore ownership extends only 180 meters outward from the shore, measured from a depth of 2 meters; beyond this, the fishing-right is free to all Swedish subjects. Furthermore, there is the important provision that in rivers and sounds, one third of the width of the watercourse, in certain cases one sixth, in the deepest place, shall be left free from fishing appliances, unless special privileges to shut off the water-course have been granted. The same is applicable to dam-buildings. This open central channel in the water-course is called »the King's vein».

With respect to the economy of fishing, there are only general provisions made in the Fishing Law, while detailed regulations are left to the governors

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of the different Läns, which have the right to issue special laws for separate water-courses, including the lakes, or for the whole of a larger or smaller portion of the Län after the hearing of the fishery-owners concerned and the fishery officials. The decision of the governor can be appealed to the King.

Fishery Administration

has been gradually developed without any integral plan, and can as yet not be said to be fully carried out.

During the eighteenth century the care of the fisheries rested upon the Board of Trade. Towards the end of the century, there was appointed during the great herring-period in Bohuslän, a »superintendent of the herring-fisheries», but when this period came to a close, the post was no longer filled, and the fisheries were long in want of any official. About 1850, the governor of Bohuslän appointed a *superintendent of the sea-fisheries* of the province. At about the same time, the Academy of Agriculture appointed a traveling *teacher in fish-culture, etc.*, and in 1864 a *fishery superintendent* with two assistants, who were paid by the State. In 1890, when the administrative duties of the Royal Academy of Agriculture were transferred to a special office, the Royal Board of Agriculture, one of its members was appointed, under the title of *Fishery Inspector*, to take over the principal duties of the fishery superintendent and to be chairman in fishery matters in the Board. The assistants became officials subordinate to the Board. Thus we have in Sweden at present the following fishery-officials of the State: a fishery inspector; two *assistants*, the first and the second fishery assistant; a teacher in fish-culture, etc.; besides an assistant official, the *fishery stipendiate.* Besides, there are a fishery intendant in Bohuslän as well as fishery overseers and fishery instructors in most of the other Läns, paid by local corporations, usually with a subsidy from the State. Since 1885, a *commercial fish agent*, with support from the State, has been appointed first in London and then in Berlin to promote the sale of Swedish fishery products and to give information in regard to the fish market.

For the promotion of fishery industry, the Riksdag of 1892 granted a *loan-fund* of 100,000 kronor to procure the fishing inhabitants access to cheap loans (instalment loans for at the most eight years at 3 per cent) for buying boats, building smaller smokeries, salting works, and such like. This fund, which during the last few years has been raised a couple of times and now amounts to about 620,000 kronor, is very much used. The loans, which during the first year are free of interest and then at a rate of 3 %, and amortized during 10 years, are granted, with the Agricultural Societies as negotiators, after application, for the West coast, to the Governors, and for the remaining Kingdom to the Board of Agriculture.

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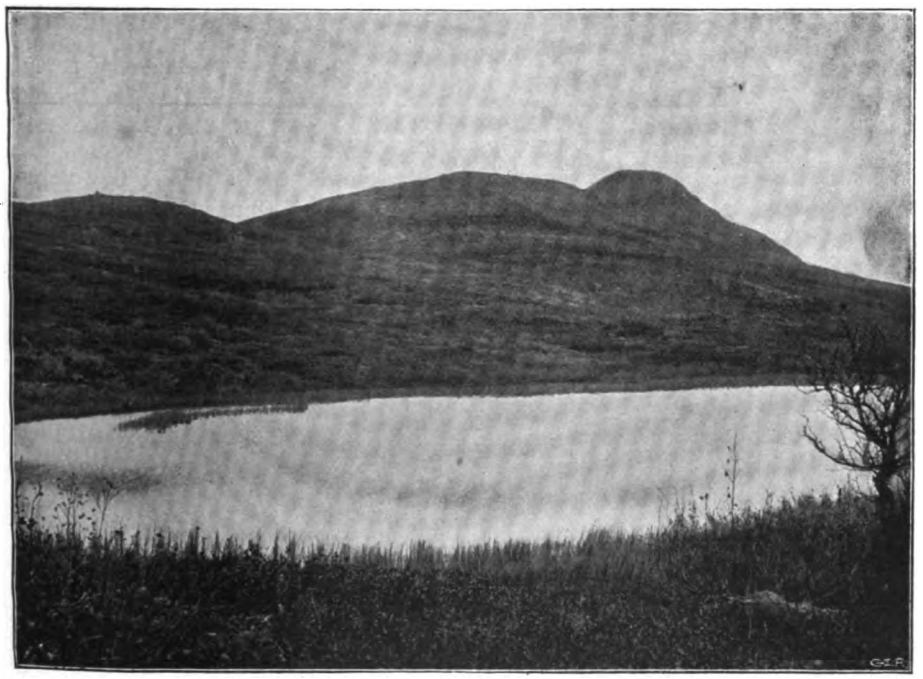
IX.

MINING INDUSTRY AND METAL PRODUCTION.

For many centuries mining has been one of the chief industries of Sweden, and few countries present mining records of greater interest. Our country is on the whole uncommonly rich in ore deposits of different kinds, and mining as well as metallurgy reached with us quite early a very considerable degree of development. With regard to *quantity*, however, our significance has greatly varied. There have been times when Sweden was ahead of any other country, both as regards the copper and the iron production. It is well known that we



Mt. Kirunavara.

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long ago lost this dominant position and this fact is due to circumstances which we shall treat more particularly in the following. As to the standard of technics and the quality of production, Sweden still stands among the foremost of the mining countries.

The Census of 1890 showed that at least 125,000 persons in our country derived their support from mining industry and metal production, and the Census of 1900 gives as the probable number the figure 175,000, hence a considerable increase.

The mining of ores and other minerals (except stone) has during the last decades reached the figures shown by the following Table.

TABLE 95. *Mining of Ores and Minerals in Sweden, in 1871/1902.*
Metric tons à 2,204 *lbs.*

Ores and minerals.	Average 1871/75.	Average 1876/80.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1902.
Iron	795,263	726,712	877,408	932,470	1,519,325	2,294,760	2,896,616
Gold	—	—	594	1,129	1,809	907	—
Silver and lead	10,949	11,002	14,045	14,754	16,552	8,644	9,378
Copper	44,273	28,055	25,276	20,266	23,941	23,590	30,095
Nickel	5,026	2,802	1,289	495	97	—	—
Zinc	30,539	40,712	45,779	53,402	48,315	57,701	48,783
Cobalt	34	307	288	190	79	—	—
Manganese	488	718	3,426	8,977	6,090	2,487	2,850
Sulphur pyrites	2,123	1,144	1,481	1,319	853	448	—
Coal	50,397	93,434	150,606	176,516	203,390	235,626	304,733
Fire clays [1]	.	.	.	98,063	129,295	130,912	161,312
Clinker clays [2]	.	.	.	.	24,765	35,541	65,024
Feldspar [3]	.	.	.	.	.	16,814	17,960
Graphite	.	.	.	.	.	100	—
Total	939,092	904,886	1,120,192	1,307,581	1,974,511	2,807,530	3,536,751

At these mines 14,654 workmen were employed in 1902. The value of production was estimated at about 20 million kronor (à 1·10 shilling or 0·268 dollar), and the income of mine-owners estimated for taxation amounted to about 4·63 million kronor.

Regarding the **production of metals,** it is rather difficult to obtain figures for the whole production, inasmuch as difficulty always arises at the drawing of the line of demarcation between the industry for the extraction of the metal and the manufacturing industry. According to the reports of the Board of Trade and the division there followed, there were in 1902, 16,096 workmen employed in the first branch, and the assessed income amounted to 4·95 million kronor.

In the mining industry and the production of metals **taken together,** there was thus employed, in 1902, a total number of 30,750 workmen, and the income of employers estimated for taxation amounted to 9·58 million kronor.

[1] No returns until 1888. The figure 98,063 is the average for 1888/90. — [2] No returns until 1894. The figure 24,765 is the average for 1894 and 1895. — [3] No returns until 1899.

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TABLE 96. *Imports and exports of manufactured and unmanufactured minerals and metals.* (A krona = 1·10 shill. or 0·268 dollar.)

Average for the years	*Imports.* Value in thousands of Kr.				*Exports.* Value in thousands of Kr.			
	Minerals.[1]	Unmanuf. metals.	Metal manufactures.	Total.	Minerals.[1]	Unmanuf. metals.	Metal manufactures.	Total.
1871/75.....	20,576	9,542	9,526	39,644	1,622	46,409	1,537	49,568
1876/80.....	20,918	9,306	7,849	38,073	2,730	34,513	1,390	38,633
1881/85.....	27,042	8,614	12,251	47,907	4,911	40,645	4,336	49,892
1886/90.....	35,107	9,300	14,076	58,483	9,239	34,523	4,249	48,011
1891/95.....	44,240	9,002	17,843	71,085	18,742	30,995	4,979	54,716
1896/00	74,434	17,931	25,869	118,234	31,575	40,459	9,077	81,111
In 1900.....	109,099	25,556	28,708	163,363	36,406	52,395	11,016	99,817

A general view of the **imports and exports** of products of the mining and metal production industries can be had from Tables 96 and 97, p. 684 and 685. The first one shows the total imports and exports both of manufactured and unmanufactured minerals and metals, the second table only treats of the raw materials.

With regard to the total mineral and metal industry of Sweden, including also the corresponding manufacturing industry (not machinery), Table 96 shows that during the period 1871/85 the value of the exports surpassed that of the imports, but since that time the ratio of the imports has been rising considerably.

The manufacturing industry, however, is to be treated of in a special chapter; the subject to be considered here, is only the mining industry and the extraction of metals. Thus, in confining us hereto, we will find the figures of imports and exports in the Table 97.

To begin with, leaving aside coal and coke, we note a yearly *excess of exports* during the whole time; for the different five-year periods (1871/1900), this excess amounts respectively to 32·64, 20·99, 25·73, 20·38, 20·27, and 25·37 million kronor per annum; for the year 1900, the amount was raised to 30·33 millions. No progress has thus been made, and the last column of the Table evidently testifies to unfavourable circumstances for the sale of our iron products during the greater part of this time. The improvement shown in 1896/1900 is chiefly due to the ore exports.

If also coal be included, as it properly should be, the result assumes quite a different appearance. Also in this case an excess of exports is seen for the years 1871/85, but afterwards the reverse is the case. The year 1899 shows an *excess of imports* of more than 30 million kronor, which in 1900 was nearly doubled (55 millions). Our coal imports for the latter year amounted to the enormous sum of 85 million kronor. Yet this is due also to the unusually high prices of this year. In the

[1] Manufactured and unmanufactured minerals.

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TABLE 97. *Imports and exports of unmanufactured minerals and metals.*

Average for the years	Imports. Value in thousands of kronor à 1·10 shilling.				Exports. Value in thousands of kronor à 1·10 shill.			In % of the total	
	Coal and coke.	Other minerals.	Metals.	Total.	Minerals.	Metals.	Total.	Imports.	Exports.
1871/75	13,452	5,304	9,542	**28,298**	1,077	46,409	**47,486**	11·48	23·22
1876/80	12,719	5,635	9,306	**27,660**	1,413	34,513	**35,926**	10·31	17·12
1881/85	15,847	8,048	8,614	**32,509**	1,747	40,645	**42,392**	10·24	17·40
1886/90	22,560	9,038	9,300	**40,898**	4,196	34,523	**38,719**	12·19	14·20
1891/95	29,770	10,855	9,003	**49,628**	9,131	30,995	**40,126**	14·11	12·61
1896/00	53,494	15,701	17,931	**87,126**	18,544	40,459	**59,003**	19·26	16·45
In 1900	85,026	19,026	25,556	**129,608**	22,519	52,395	**74,914**	24·28	19·14

two following years, with more normal prices, the amounts were respectively 59 and 57 million. Still the desirability of being able to furnish inland fuel has during the later years been more evident than ever.

In the mining industry 73 % of the income taxed comes on the **iron** alone, and in the metal production as much as 95 %. These figures show the dominant position which the metal just mentioned occupies within the mineral industry of Sweden, of which the above Table 95 also bears witness. This being the case, the following presentation of the subject has been arranged in such a way that the iron industry is treated of by itself — the mining as well as the extraction of iron —, while part of the information concerning the other ores and metals is given in connection with the iron industry, while the rest has been made the object of a common, more brief treatment. Lastly, an account is given of the public and private institutions, established for the promotion of the mining and metal production industries.

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1. THE IRON MINES.

Of the whole area of Sweden, which amounts to 447,862 square kilometers, a comparatively small part consists of **ore-regions** (see p. 683). In the whole of Central and Southern Sweden, the principal ore-regions are concentrated within an area of about 15,000 square kilometers, or within a region which stretches from the southernmost part of the Gulf of Bothnia in the east to a point north of Lake Venern in the west. Outside of this zone there occur only a small number of deposits, such as the Taberg iron ore stock in the province of Småland, the copper ores of Åtvidaberg, in Östergötland, and some iron, copper, and manganese ores in Östergötland and Småland.

Within the aforesaid ore-zone there occur in the east the *Dannemora ore-fields*, whose ores have a world-wide fame on account of their phosphorus-free quality, and because of other eminent qualities. In

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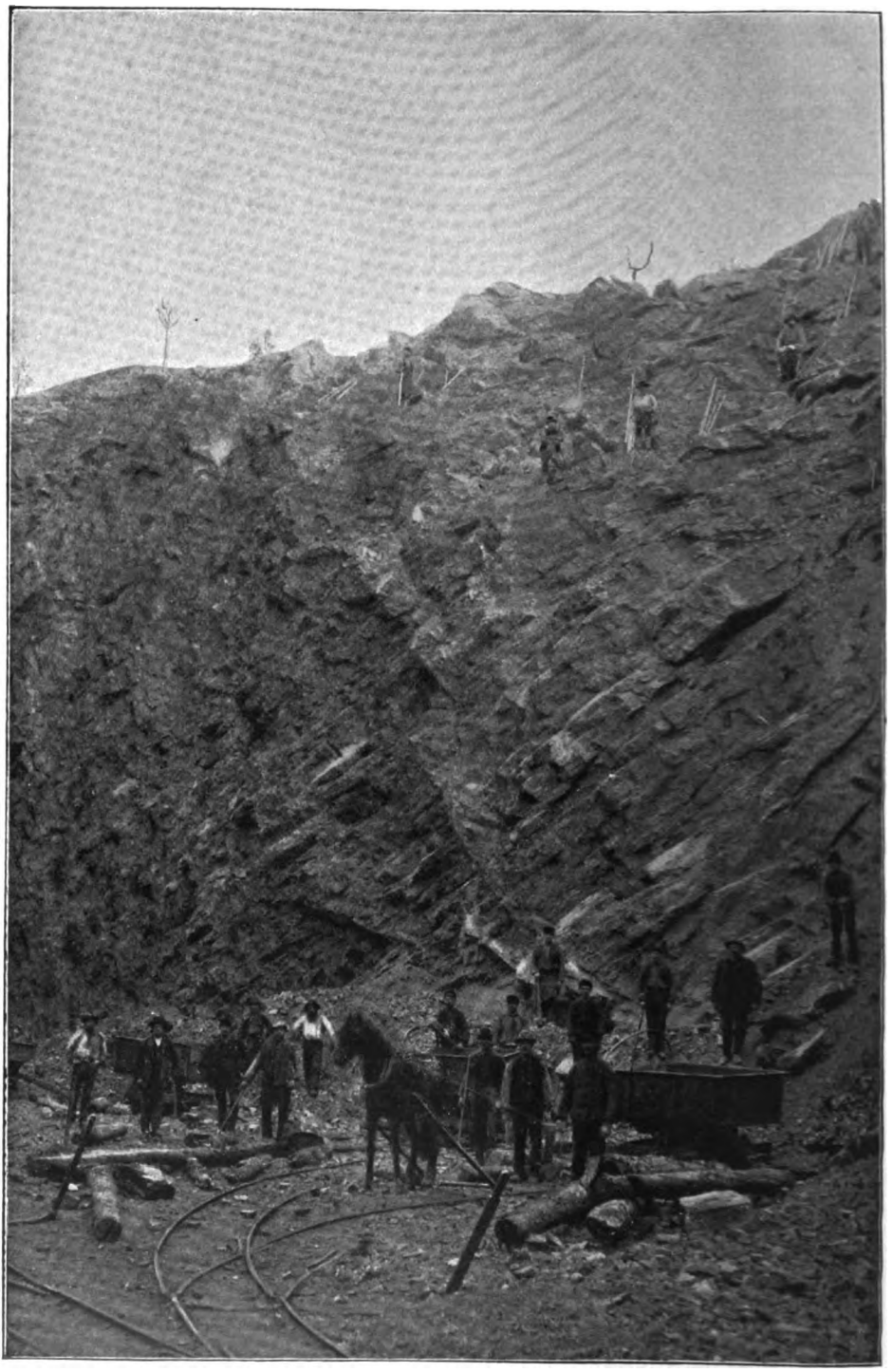

Gellivare. Above-ground mining.

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the central part of this district are situated the mines of *Norberg*, *Bispberg*, *Grängesberg*, *Riddarhyttan*, *Striberg*, *Stripa*, and a large number of other important iron ore fields. Furthest to the west, there are the mines of *Persberg*, *Nordmarken*, *Taberg* (in Vermland), and *Långban*.

North of this ore-zone, there occur in several places ores of different kinds, but the most important of these are situated in the neighbourhood of the arctic circle, or in the northernmost part of Norrland. Here we find ore-deposits at *Gellivare*, *Kirunavara*, *Luossavara*, *Svappavara*, and *Ruotivare*, several of which, with respect to their length, thickness, and percentage of iron, are the most prominent iron ores in Sweden; the whole complex can be regarded as the thickest and richest among the iron ores of the world. Thus the horizontal section of the ore-deposit at Kirunavara-Luossavara has an area of 500,000 square meters. The same section of the ores at Gellivare amounts to 200,000 square meters. At Ruotivare the area of ore is estimated at 300,000 square meters, and at Svappavara at 50,000 square meters. On account of the lack of communications, however, only the Gellivare ore-field has hitherto been worked, but Kirunavara and Luossavara also have now begun to be worked since the Gellivare-Luleå railway has this year (1903) been extended to the port of Narvik in Norway, which is free from ice the year round.

As a contributing cause for these ores not having been worked on a larger scale before, we may mention, besides the lack of communications, in some cases their great percentage of phosphorus (Gellivare, Kirunavara), in others, the great percentage of titanium (Ruotivare).

All the aforesaid Swedish iron ores belong to the so-called mountain ores, and are for the most part magnetic ores; only a comparatively small portion consists of blood-stone (hæmatite), or of a mixture of magnetite and hæmatite. In 1902, the production of magnetite amounted to 2,615,533 tons, while the production of hæmatite amounted to 280,675 tons. Thus, during the aforesaid year, 90·3 % of magnetite, and only 9·7 % of hæmatite were mined.

The iron ores contain, besides the ore-minerals, a large number of other minerals called »skarn» (gangues), appearing partly in larger or smaller quantities, and partly in more or less intimate mixture with the ore-mineral, and therefore contributing to give the ore a certain character. Among others, quartz is an ordinary constituent, especially in hæmatite ores. Furthermore, we find feldspar, chlorite, talc, pyroxene, amphibole, epidote, garnet, and apatite, several of which are contained both in the magnetite and the hæmatite ores.

Certain iron ores are characterized by their richness in lime. They are called in practice »*blandstenar*» (*fluxing-stones*). On the other hand, the ore whose skarn or gangue is principally composed of pyroxene, amphibole, garnet, etc., can be used alone, without the admixture of other ores in making pig iron, and are therefore called »*engående*» (*self-fluxing*). Finally, we have in the quartzy iron ores a third class, the »*torrstenar*» (*dry stones*).

Based only on the variations in the chemical and mineralogical composition of the ore-mineral and the minerals which accompany it, we may make the fol-

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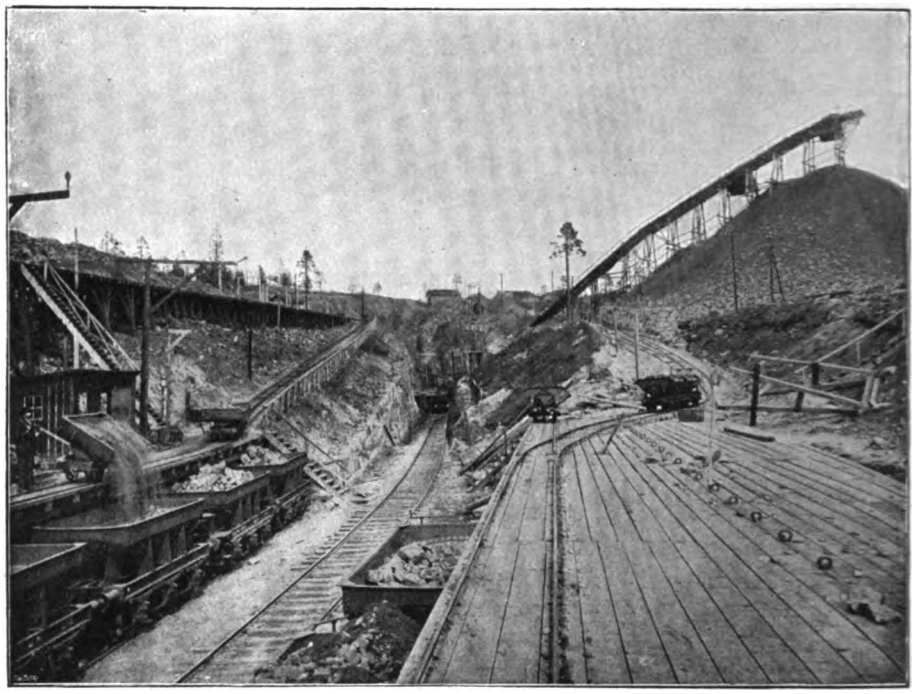
lowing grouping of the iron ores of Sweden: *a*) iron ores principally accompanied by quartz and feldspar: ores belonging to this class are mostly hæmatites; *b*) apatitiferous ores: sometimes magnetic ores and sometimes hæmatites; *c*) pyroxeniferous, amphiboliferous, and garnetiferous ores: exclusively magnetite; *d*) calciferous and manganiferous ores: usually magnetite; *e*) titaniferous ores: exclusively magnetite.

As a rule, especially the ores occurring in Central Sweden contain very little *phosphorus*. Generally the percentage of phosphorus varies here between 0·005 % and 0·05 %. On the other hand, there are ores which contain from 0·1 up to 1·5 % of phosphorus, for instance some ores in Grängesberg, Gellivare, and Kirunavara. In the last two ore-fields, there are also ores which contain 1·5 to 3 % of phosphorus.



Gellivare. Transport of Ore.

Besides these kinds of iron ore, *lake* and *bog ores* are made use of in some provinces, especially in Småland. The production of this kind of ores has, however, always been insignificant in comparison with the production of mountain ores, and during latter years it has decreased so considerably that, in 1902, it only amounted to 408 tons.

All the aforesaid ores, with the exception of the lake and bog ores, occur in rocks belonging to the archæan series or azoic age (primitive rock), such as gneiss, petrosilex-gneiss, petrosilex, especially the two latter.

All of these ore-deposits have, as a rule, the form of lenses, stocks, and kernels (pockets). They are for the most part lenticular, and if so, have the same dip and strike as the nearest countries. They are therefore considered as contemporaneous in origin with these and have also in other respects a certain correspondence with them, wherefore all these ores are considered to be *stratifications*.

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Only a few deposits appear in the form of *lodes* (veins) and *masses*. To this latter category may be reckoned, among others, some iron ores occurring as lode-stocks in certain eruptive rocks (gabbro and hyperite). The best known of these ore-deposits is the one at *Taberg* in the province of Småland, situated about 11 kilometers from the city of Jönköping. It forms a mountain of 450 meters in breadth, 900 in length, and 125 meters in elevation above the nearest surrounding country. The only ore which can be considered as real vein ore is that which has been mined at Hesselkulla in Nerike. The country is here primitive granite. As lode-formations we may also mention certain manganese, silver, copper, lead, and blende deposits. Finally, pure gold has been found on lodes or ramifications of quartz at Ädelfors in Småland and in the Falun Copper Mine. In the latter mine, the gold occurs within the quartzite or hard-ore region, where it is accompanied by the mineral galeno-bismuthite.

Resources of iron ore in Sweden.

The thickness of the iron ores varies greatly, partly on account of their lenticular shape, and partly on account of the dislocations and folds to which they have been subjected after their formation. The thickness is greatest in the ores of the renowned ore-mountains in Norrbotten. Thus, in Kirunavara it varies between 35 and 150 meters. In Gellivare there are ores up to 70 meters in thickness.

Among the iron ore fields of Central Sweden, Grängesberg stands foremost in this respect. Here the thickness of the ore goes up to 90 meters. In the other larger ore-fields, it varies, as a rule, between 12 and 30, and occasionally runs up to 35 meters. In most of the fields, it is, however, less than 10 or 12 meters. With a thickness of two meters, the ores are still considered to be worth mining. Sometimes, however, iron ores are mined which have a lesser thickness than the last mentioned, but this is then dependent upon quite special properties of the ore.

With respect to the **longitudinal extent** in the direction of the strike, the Norrbotten ores also take the foremost place. Thus, the stock-shaped ore in Kirunavara has a continuous length of 3,500 meters, and in the adjacent Luossavara, the ore reaches a length of nearly 1,300 meters. In the Gellivare mine, also situated in Norrbotten, it is true that there are not continuous ores or ore-stocks of such great length as in Kirunavara, but the total length of the ore-lenses here, and their intermediate deads, in some places reaches to 7,000 meters.

In the iron ore fields of Central Sweden, which have been worked since olden times, there do not occur ore-lenses or ore-stocks of such very large continuous length as in Kirunavara. The most prominent ore-fields in this respect are those at Norberg and Grängesberg. At the former ore-field, there are ores whose length runs up to 1,200 meters; at the latter, the greatest length is about 1,000 meters. An ore-length of 200 to 300 meters occurs at several ore-fields.

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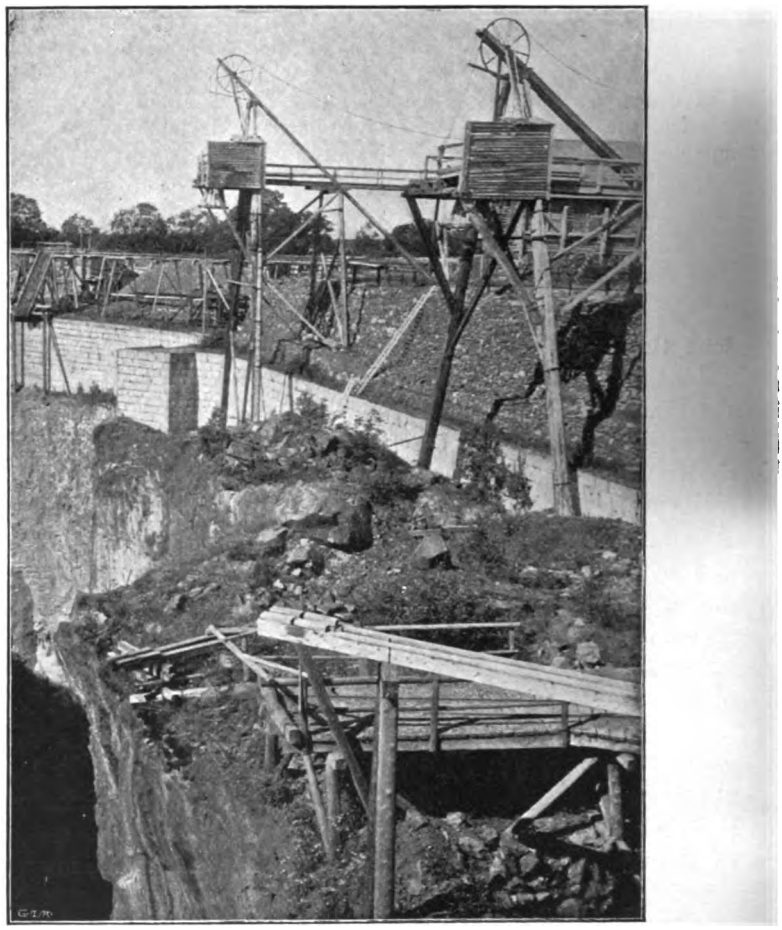
If, on the other hand, we take into consideration the *total length* of the ore-field, or the length of the whole series of the ores lying continuously after one another in the direction of the strike, we will reach still higher figures. Thus the total length of the Norberg ore-field is nearly 20,000 meters, and that of the Grängesberg ore-field



Dannemora. The old mine »Storrymningen».

and the Lomberg one connected with it is 4,000 meters; that of the Riddarhyttan ore-field 3,500 meters, and that of the world-renowned Dannemora ore-field 2,000 meters. Along the direction of the dip, iron ores have been mined to a depth of, at the most, 400 meters along the dip.

From what has already been said of the length and thickness of some ores, it may be concluded that Sweden possesses quite considerable resources of iron ore. This is more clearly shown by the following

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At the Striberg Mines, Åsboberg.

Table, in which is given the area of the *horizontal section* of the ores, or the **ore-area,** of some among the largest iron ore fields in Sweden, and the continuous ore-area of the other ore-fields, estimated approximately. Since the *lateral dip* of the majority of our iron ores, reckoned from the horizontal plane, is very great, this Table of the ore-area in the different mines and ore-fields, gives a tolerably exact idea of the resources of iron ore in Sweden.

Mines.	Sq. m.	Mines.	Sq. m.	Mines.	Sq. m.
Kirunavara-Luoss.	430,000	Riddarhytte bruk	25,000	Stråssa	3,200
Ruotivare	300,000	Dannemora	12,250	Pershyttan	3,200
Taberg (Småland)	260,000	Persberg	10,000	Sköttgrufvan	2,780
Gellivare	200,000	Striberg	7,000	Finnmossen	2,400
Grängesberg	90,000	Stripa	6,000	Bispberg	2,000
Svappavara	50,000	Kantorp	6,000	Nordmark	1,500
Norberg	30,000	Dalkarlsberg	4.900	Other (approximat.)	125,770

To this total iron ore area, 1,572,000 square meters, should be added the ore-area of the great number of iron ore deposits and mines for some reason or other lying in neglect, which are included in or situated in the vicinity of our larger ore-fields and likewise at the majority of our smaller ones. It cannot even approximately be estimated how much the aforesaid total area would hereby be increased.

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Finally, we must note the **iron percentage** of our ores, which, as known, is generally very high. While the British ores on an average contain 35 % of iron, the French 36, the German 37, the Austrian a little above 40, and the Spanish export ores somewhat above 50 %, the Grängesberg ore reaches as high as from 62 to 63 %, the Gellivare ore from 64 to 65 %, and finally the ore from Kirunavara and Luossavara up to 66 %. In this connection it may be appropriate to observe that theoretically the percentage of iron *cannot* exceed 72·5 % in magnetite ores and 70 % in hæmatite ores, however pure they may be. None of the great industrial countries of Europe can show a counterpart to these Swedish ores; only in America there has been found equally rich ores, which, however, on account of their position scarcely can become of any direct significance to the European market.

Ore raised and exported.

The amount per year of **iron ore raised** in Sweden has during the last decades gained an extent as shown by the following figures:

Average.	Metric tons.	Average.	Metric tons.	Average.	Metric tons.
1833/40	235,000	1866/70	553,759	1886/90	932,470
1841/50	270,000	1871/75	795,263	1891/95	1,519,325
1851/60	349,000	1876/80	726,712	1896/00	2,294,760
1861/65	464,363	1881/85	877,408	In 1902	2,896,616

During 1903 the amount of ore raised has increased very considerably, owing to the opening of the work in the Kirunavara-Luossavara mines. The total iron ore production in Sweden this year may have nearly reached 4 million tons. As the world's total production of iron ore during the same year may be calculated to nearly 100 million tons, it follows that Sweden's contribution amounted to about 4 %.

The last mentioned figure does not, however, give us a full idea of the significance of Sweden in this case, for it must still be borne in mind that the Swedish ores on an average are richer than those of other countries. In consideration of the actual iron percentage, the share of Sweden would rather amount to about 4 1/2 % of the world's production; an exact figure in this respect cannot, however, be given.

With respect to the iron ore production of other countries, some facts are given in Tables 98 and 99. From these we find that from 1871/75 to 1900 the share of the British Isles had *lowered* from 48·27 to only 16·14 %, while that of Germany had *risen* from 15·79 % to 21·47, that of Spain from 1·84 % to 9·82, that of Russia from 2·59 to 7·02 %, and that of the United States from 13·60 to 29·32 %. The share of Sweden was 2·39 % during 1871/75, and 2·96 % in 1900, but, as it is shown above, in 1903 about 4 %.

The total amount of **iron ore raised** in Sweden was in 1902 distributed on the different Läns as follows: Norrbotten 45·87 %, Kopparberg 27·47, Örebro

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TABLE 98. *Mining of Iron ore in various countries.* Metric tons à 2,204 *lbs.*

Countries.	Average 1871/75.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/1900.	In 1900.
Sweden	795,263	877,408	932,470	1,519,325	2,294,760	2,609,500
Great Brit. and Irel.	16,086,731	17,154,326	14,250,198	12,248,651	14,255,926	14,253,327
Belgium	568,542	202,214	172,861	254,958	242,902	247,890
Germany	5,261,829	8,556,667	10,182,597	11,679,170	16,496,701	18,964,294
Austria	870,191	861,817	1,025,741	1,186,659	1,683,148	1,894,458
Hungary	367,013	582,435	658,768	997,084	1,511,898	1,633,983
France	2,650,655	3,018,445	2,849,795	3,651,068	4,761,883	5,447,694
Italy	203,081	258,611	202,201	198,675	215,722	247,278
Spain	612,531	4,119,163	5,766,044	5,345,506	7,890,576	8,675,749
Russia	862,865	1,007,177	1,415,891	2,249,279	4,791,294	6,200,000
Algeria	393,424	538,571	416,159	382,747	488,452	601,788
United States	4,532,000	8,515,600	12,987,990	14,287,554	21,420,504	26,332,071
Other countries	121,949	249,902	642,847	1,000,000	1,200,000	1,200,000
Total	**33,326,074**	**45,942,336**	**51,503,562**	**55,000,676**	**77,253,766**	**88,308,032**

11·26, Vestmanland 8·28, Vermland 2·97, and Uppsala 2·18; the remaining 1·97 % were distributed on the läns of Södermanland, Stockholm, Gefleborg, and Östergötland. In 1903, the proportion for the Län of Norrbotten may have risen to nearly 60 %. In earlier times, before the Lappland ores were being mined, the above shares were of course quite different. Thus, during 1886/90, Örebro Län still contributed 25·69 % of all our iron ore, Vestmanland Län 20·99 %, Vermland Län 10·11 %, Uppsala Län 7·24 %, etc. Of all the Läns in Middle Sweden, only that of Kopparberg has been able to maintain its old position, which is due to the mining of the Grängesberg fields; in 1886/90, the share of this Län was a little more than 26 %, and in 1902, as just stated, 27½ %. In 1903, however, naturally also this Län has got its proportion lowered, owing to the immense increase in Norrbotten.

In 1902, altogether 5,130,736 tons of *rock and ore* were mined; of this were received 2,860,856 tons of picked and cobbed ore, thus equivalent on an average to 55·8 %. The number of *workmen* amounted to 10,496, and the amount of rock mined under ground per every workman there occupied amounted to 466 tons, which comparatively low figure is explained from the large number of workmen occupied with preliminary work in the newly opened mines.

In the Swedish mines **taken altogether** (thus also other than iron mines), 14,654 workmen were employed in 1902, 1,557 of whom were under eighteen years of age. During the same year, 460 workmen were injured through accidents disabling for work during at least fourteen days; besides these, there were 16 accidents which proved fatal.

In the same year, 589 *motors* were employed in mining. For 498 of these the power was stated, and amounted altogether to 14,560 horse-power. Of this power, 46·8 % consisted in steam engines, 18·8 % in water-wheels and turbines, 33·0 % in electric motors, and 1·4 % in motors of other kinds.

Sweden's **export** of iron ore is shown in the diagram on p. 696 and in the Table on p. 697. In 1903, it reached 2,828,000 tons. In 1902, before the opening of the Kirunavara—Luossavara mines, the figure was 1,729,000 tons to a value of 14·01 million kronor.

The Grängesberg mining fields, situated partly in the Län of Kopparberg, and partly in Örebro Län, have been mentioned above. The greatest part is owned by the Grängesberg Mining Company, Ltd. The Grängesberg-Oxelösund Traffic

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TABLE 99. *Percentage of the world's production of iron ore.*

Years.	Sweden.	Great Britain and Ireland.	Germany.	Austria-Hungary.	France.	Spain.	Russia.	United States.	Other countries.	Total.
1871/75.....	2·89	48·27	15·79	3·71	7·95	1·84	2·59	13·60	3·86	100
1876/80...	2·05	46·93	15·98	2·76	7·03	5·37	2·59	14·32	2·97	100
1881/85.....	1·91	37·34	18·68	3·14	6·57	8·96	2·19	18·54	2·72	100
1886/90.....	1·81	27·67	19·77	3·27	5·53	11·20	2·74	25·22	2·79	100
1891/95.....	2·76	22·27	21·23	3·97	6·64	9·72	4·09	25·98	3·34	100
1896/00.....	2·97	18·45	21·36	4·14	6·16	10·21	6·20	27·73	2·78	100
In 1900 [1])...	2·96	16·14	21·47	4·00	6·17	9·82	7·02	29·82	2·60	100

Company, Ltd., with a joint capital of 21 million kronor, has for its object the acquiring and holding of shares in the private railroads running between the mining district and the place of export, and to develop the traffic on these railroads; the company also purchases shares in mines. The export of ore via Oxelösund, near Nyköping, commenced on a somewhat larger scale in the later part of the decade 1881/90; in 1902 it amounted to 609,070 tons. The greater amount is disposed of to the eastern part of Germany, where the rich Swedish ores are mixed with the poorer German ones. The exportation of ore from Grängesberg has gathered quite a considerable population to this place, has improved the financial condition of several of the private railroads in Middle Sweden, and has created a rising community at the harbour of Oxelösund. — Very recently (in 1903) this Company has acquired disposition right to the majority of shares in the Gellivare Ore-field Company (and thus indirectly also in the Kirunavara-Luossavara fields, see below); hence the direction of all the principal exporting iron-ore-fields of Sweden is now united in the hands of the same party.

The history of the **Gellivare fields** dates a little more than one hundred years back. The first trials at mining were made by *S. G. Hermelin*. In 1864, the ore-fields were sold to Englishmen, and an English company was granted concession to a railroad, Luleå—Ofoten, of which only the distance Luleå—Gellivare was completed. Since the English company failed, the mines were again turned into Swedish hands, and the railroad was recovered in 1891 and completed by the Swedish State. Most of the mining fields are owned, since 1891, by the Gellivare Ore-field Company, Ltd., which has its head office in Stockholm; its joint capital is 6 million kronor at the lowest, 18 million at the most. Besides this, mining is carried on by the Freja Mining Company, Ltd. (invested joint capital 1 1/4 million kronor), which has its head office at Malmö. The ore is transported by rail to Luleå (207 kilometers), at 3 kronor per ton (thus 0·31 *d.* per Eng. ton-mile). The freight by steamer to Rotterdam is about 7 shillings per ton. The exportation takes place at the lading place Svartön at Luleå, where arrangements have been made for the same. For transport by sea, steamers of a capacity from 2,000 to 7,000 tons are employed. — The exportation on a large scale commenced in 1892, and rose during 1902 to 1,074,000 tons, of which about one tenth was from the mining company Freja. In our statistics of exports, the iron ore exported from Sweden was valued at place of lading to about 9 shillings per ton. Most of the Gellivare ore exported goes via Rotterdam to Westphalia, or via Stettin to Silesia. Lesser quantities go to England and Austria.

At *Malmberget* the mining work has already gathered a population of over 7,000, which continues to be rapidly increasing. The organization of this community as regards dwellings and supply, etc., has been connected with great diffi-

[1]) In 1903, the percentage of Sweden was about 4 %, see p. 692.

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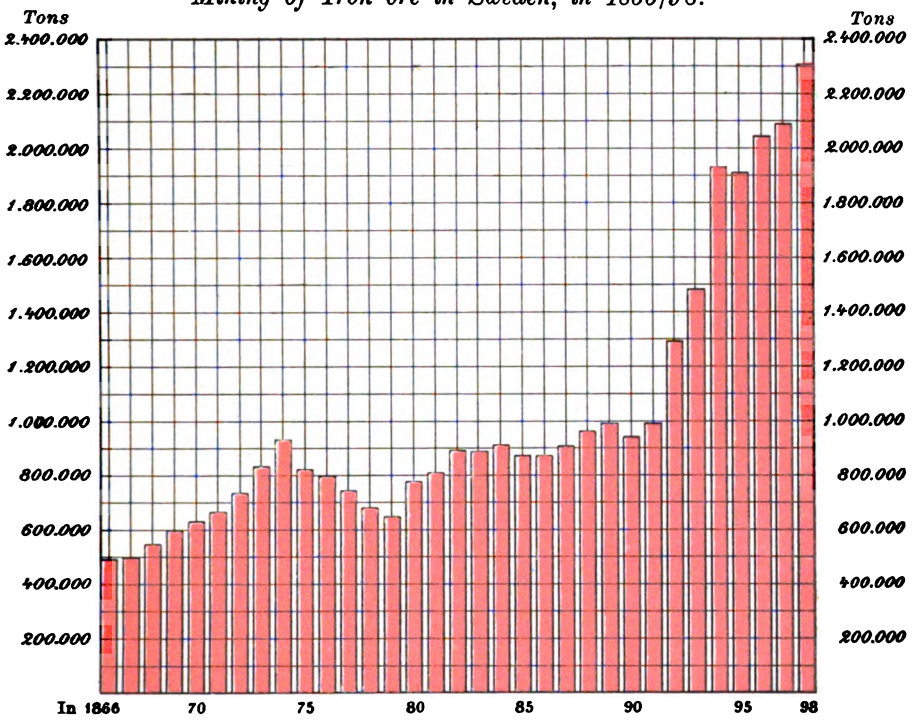
Mining of Iron ore in Sweden, in 1866/98.[1]



culties, which however are now considered as surmounted. The port town *Luleå* has in few years grown up to a population of 10,000 inhabitants.

The **Kirunavara and Luossavara fields** are now opened for the world's market, inasmuch as the railroad to Gellivare (about 100 kilometers) and the one to Ofoten at the Atlantic Ocean (168 kilometers, of which 39 kilometers are in Norway) were opened for traffic in 1903. The mines are owned by the Luossavara-Kirunavara Company, Ltd. (capital invested, 3 million kronor), in which the Gellivare ore-field company is a great share-holder. As is said before, since 1903 the management of both companies is in the hand of the Grängesberg—Oxelösund Traffic Company, Ltd, that also disposes of the large exporting ore-fields of Central Sweden. According to contract with the Government, the mining company has to pay to the State an interest of 3·8 per cent on the cost for building the railroad from Gellivare to the boundary of the kingdom, compensation for maintenance and traffic expenses with regard to transport of the company's goods up to 1,200,000 tons yearly, and compensation for the loss that may be caused in other traffic to the railroad; for the ore transported to an amount exceeding the mentioned number of tons, are to be paid special rates. Besides this, the company guarantees to the State a net income of 4 % from the railway line Malmberget—Svartön (Luleå). For that part of the railways, which lies within Norway, the company has agreed to nearly similar obligations with regard to the Norwegian State. The terminus at the Atlantic Ocean is Narvik, where a town is already growing up.

[1] In the years 1899/1902 the production amounted to respectively 2,435,000, 2,607.000, 2,795,000, and 2,897,000 tons. In 1903, it has risen to nearly 4,000,000 tons.

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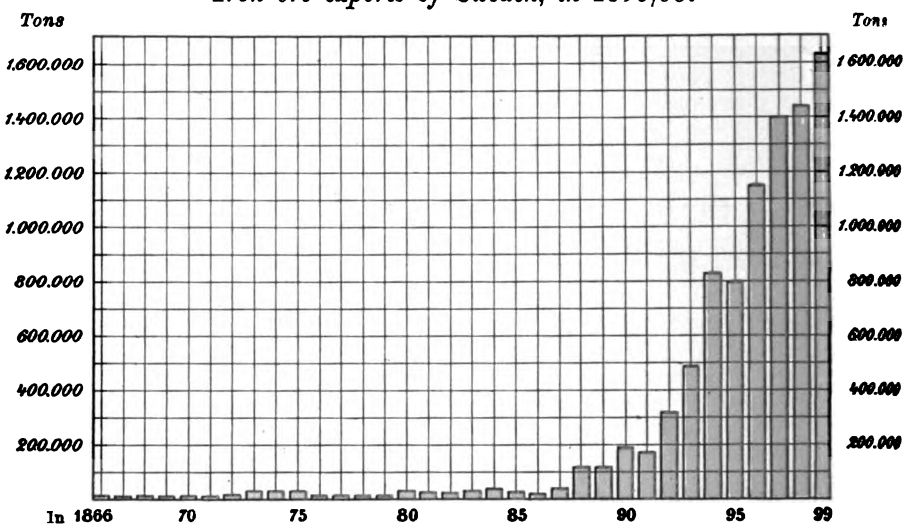
Iron ore exports of Sweden, in 1866/99.[1]



The manner in which our iron ore exports were distributed during 1888/1902 on the two mining fields which, with us, chiefly supply the market, as also according to destination, is shown in Table 100. The greatest part of our iron ore exported goes to the western part of Germany, where the Thomas process has had the most rapid growth, by reason of the Lorraine and Luxemburg ores, on account of their great percentage of phosphorus, being especially suited to this process. It is also undoubtedly of significance to our iron ore exports that the German Thomas pig iron, for which especially the Kirunavara ore is likely to be used, can be sold at a lower price than most other kinds of pig iron, and thereby has great chances in competition.

When once the problem is solved of extracting the iron by means of electricity, the prospects for the Lappland ores will be still more favourable, since this method may in the first place be expected to become practicable in the case of rich ores.

Adding to this that several of the most important places for iron ore production in the rest of Europe are in our days decreasing as to capability of supply, while the demand for imports is steadily increasing in the great industrial countries, it can be said with full confidence that our country has good prospects of bringing up its exports of iron ore considerably above the present extent.

Under present conditions, such an export is a necessary *introduction* to the higher stage, when our country itself will use its ores and send out them into the world's market in a manufactured state.

[1] In the years 1900/02 the exports have amounted to respectively 1,620,000, 1,761,000, and 1,729,000 tons, but, in 1903, the figure has risen to 2,828,000 tons.

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TABLE 100. *Iron ore exports of Sweden, in 1888/1903.* Metric tons à 2,204 *lbs.*

Years.	Exported from		Total Exports.	Exported to			
	Grängesberg.[1]	The Lappland fields.		Eastern Germany.	Western Germany.[2]	England.	Other countries.[3]
1888	31,144	70,622	**117,350**	31,972	7,220	65,406	12,752
1889	56,415	34,815	**118,573**	69,409	24,956	12,760	11,448
1890	103,875	27,520	**187,732**	122,773	35,777	6,390	22,792
1891	126,892	450	**174,148**	83,711	72,463	3,220	14,754
1892	126,515	139,194	**320,071**	112,959	183,821	11,371	11,920
1893	204,973	260,754	**484,055**	102,990	324,474	37,356	19,235
1894	289,267	525,729	**831,395**	153,814	573,605	85,197	18,779
1895	393,685	384,007	**800,452**	166,923	520,170	75,165	38,194
1896	496,102	625,795	**1,150,695**	217,507	737,598	87,203	108,387
1897	539,956	828,315	**1,400,801**	269,671	943,612	95,076	92,442
1898	579,787	821,267	**1,439,860**	260,977	997,510	101,600	79,773
1899	568,473	1,023,698	**1,628,011**	396,583	1,007,051	123,239	101,138
1900	531,904	1,054,675	**1,619,902**	422,625	967,249	102,772	127,256
1901	646,991	1,090,108	**1,761,257**	445,060	1,073,806	91,991	150,400
1902	609,070	1,074,434	**1,729,303**	404,288	954,670	173,726	196,619
1903[4]	.	2,070,000	**2,828,000**	.	.	.	.

A great incentive to such an advance lies in this that the net proceeds of the ore export does not on the whole come very high. That during present conditions, however, an entering on a large scale into manufacturing industry would be financially impossible, most authorities agree.

Technics of mining.

In the foregoing it is already intimated that our Swedish mining industry shows a very original development and is of a considerable historical interest. In the following presentation, which in the first place has for its object the treatment of present conditions, other mines also than the iron ones and especially our *coal mines*, have for the sake of better connection been taken up.

Prospecting for iron ore deposits and their exploration. In prospecting for both iron ores and other ores, magnetic instruments have long been used in Sweden. In no other country magnetic instruments have been used so long and to such a great extent for the discovery of ores as in Sweden, and nowhere these instruments have reached such perfection as here.

For discovering iron ores and for getting an idea of their position and extent, the so-called *miners' compass*, has been used for about 150 years; it is considered to be discovered by *D. Tilas*. This compass is also used for discovering other ores than iron ore, such as zinc, lead, and copper ores, which, on account of impregnation of magnetite or magnetic pyrites, are attractive.

As a rule, the miners' compass is used for discovering ores and in preliminary exploring work in ore-fields. Since the demand upon still more accurate results has increased, magnetic instruments for exploring-work in ore-fields have

[1] As exports from Grängesberg are counted the exports via Oxelösund. — [2] Quantities reported in our Commercial Statistics as exported to the Netherlands. — [3] Belgium, France, Finland, etc. — [4] Provisional figures.

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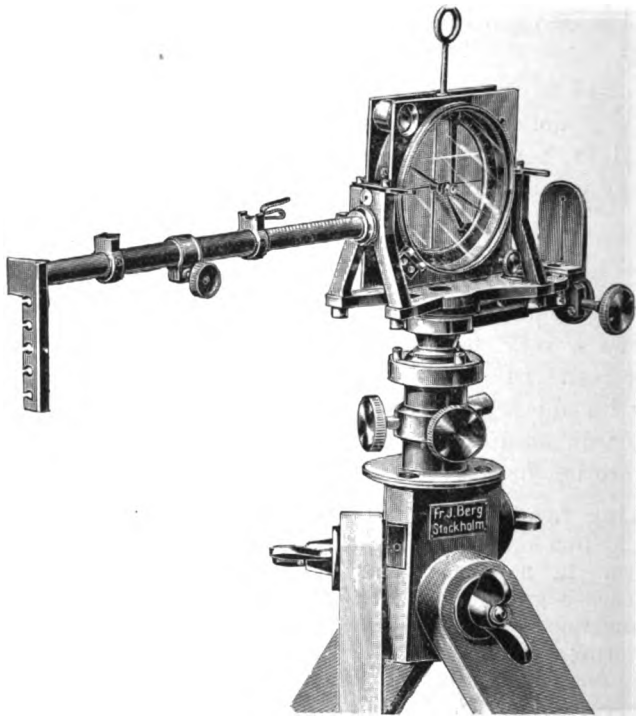
been introduced during the last thirty years, by means of which a still more exact and more detailed knowledge of the magnetic conditions can be obtained. These instruments are: the *magnetometer* constructed by Professor *Thalén*, of Uppsala University, on the Lamont principle, also the *vertical power balance* quite lately constructed by Prof. Thalén on the principle of Lord Kelvin (Sir William Thomson), and the *Tiberg inclinator* or inclination-balance. Everywhere in our mining-districts the magnetometer and inclinator have been used with the best results, both above ground and in the mines. There is doubtless not a single iron mine of any consequence in all Sweden where these instruments have not been used in one way or another, and there are *magnetic maps* of a very large number of mines based on measurements made with the one or the other of the aforesaid instruments. This has enormously facilitated the work of exploring and prospecting. When guided by the results of the magnetic measurements, it has been rendered possible to direct this work much more exactly than would otherwise have been possible, and there has been a great saving of gallery and shaft excavations and other kinds of exploring and prospecting work. Even for determining the value of smaller ore-fields, measurements are made with these instruments and magnetic maps are laid out.



Magnetic instrument. Combination of the THALÉN and TIBERG ones.

What has been said above in regard to the magnetometer and inclinator, will doubtless be said in the future in regard to the newest magnetical instrument, or the vertical power balance.

The mining compass is little known in other countries. About 1866, a similar compass was invented in America. The magnetical instruments invented by Thalén and Tiberg are still little or not at all known in other countries.

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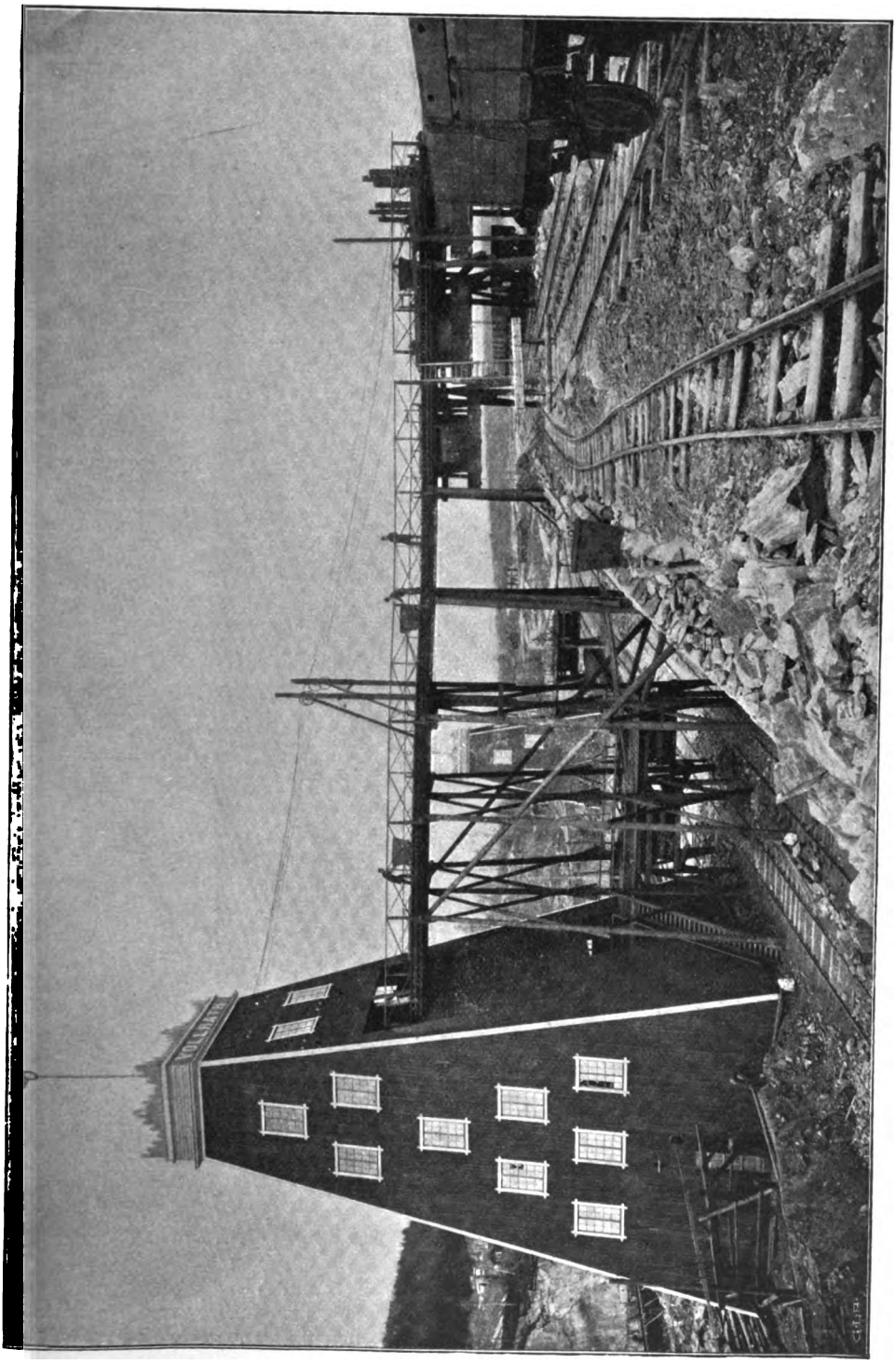

Photo. ALBIN ANDERSSON, Karlskoga.

At Grängesberg.

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In Sweden as in some other countries, *diamond-drilling* is also used for exploring ore-deposits and in excavating galleries and shafts. For diamond-drilling in other countries, it is customary to use large and rather complicated machines, which give cores from 230 to 400 millimeters in diameter, and which can bore holes 2,000 meters deep or more. In Sweden, such diamond-drilling machines have been used only on a few occasions. On account of the great compactness which is characteristic for not only our ores but also their countries, it is, furthermore, not at all necessary to use drilling-machines which give cores of such large diameter as those just described. At our iron ore fields there have been used since 1887 very simple, cheap, and easily transportable diamond-drilling machines which bore holes the thickness of whose cores is not quite one tenth of the smallest diameter given above.

All the borings with these machines have been done by *Svenska diamantbergborrningsaktiebolaget*, and the total depth of the borings done by this company since the aforesaid year (1887), in metal mines alone, amounts to about 50,000 meters. In 1900 alone, about 6,000 meters were bored. There are doubtless few countries where explorations by means of diamond-drilling in mines, in relation to the production of ore, are so extensive as here in Sweden. — The boring-machines of the Company are run partly by hand and partly by petroleum or electric motors. Especially of late years, the latter kind of motors have come more and more into use.

Boring tools and explosives. For breaking ground we use in Sweden as in other countries, boring and blasting when the ore and its country are of a compact nature.

The tools used in boring are both hammers and drills, which for more than thirty years have been made entirely of steel (Bessemer, Uchatius, or Martin), and as *explosives* only preparations of nitro-glycerine have been used for an equally long time. Gunpowder is no longer used in mining. Everywhere in the Swedish mines the boring tools are adapted so as to give the greatest possible effect. In singlehanded drilling, which is now exclusively used, the weight of the hammer generally varies between 3·5 and 4·5 kilograms, and the average weight of the drill is from 1·4 to 1·7 kilograms.

Besides by adapting this ratio of weight, the working effect has also been raised by using steel of suitable hardness for the drilling tools and by giving the bit a shape suited to our kinds of rock and ore, which as a rule are hard. By these means such advance has been made that it has been possible to use hammers for drilling 1,500 up to 3,000 meters without their wear or loss in weight amounting to more than 0·3 to 0·6 kilograms; and as to the drilling effect, it is usual *in underhand drilling* to drill 250 to 375 millimeters per man and hour, and sometimes up to 600 mm.

Besides hand-drilling, *machine-drilling* is also used, not however in stoping; but in mines where filling is used, these machines are much in use, and give advantageous results. Such mines are found at Norberg, Grängesberg, Ammeberg, Dannemora, Falun, Striberg, and Stripa, where drilling machines are used both in overhand and cross-stoping, and in driving galleries.

Among the different kinds of *compressed-air drilling machines* used, Schram's, Ingersoll's and Rand's, and modifications of these, have been found to be the best, and are therefore in general use.

Electric rock drilling machines of the Marvin type have also been used in recent years.

In order to give an idea of the efficiency which is generally reached in using compressed-air drilling machines, it may be mentioned that in overhand working, which is the usual fillingmethod, the amount of rock broken loose per

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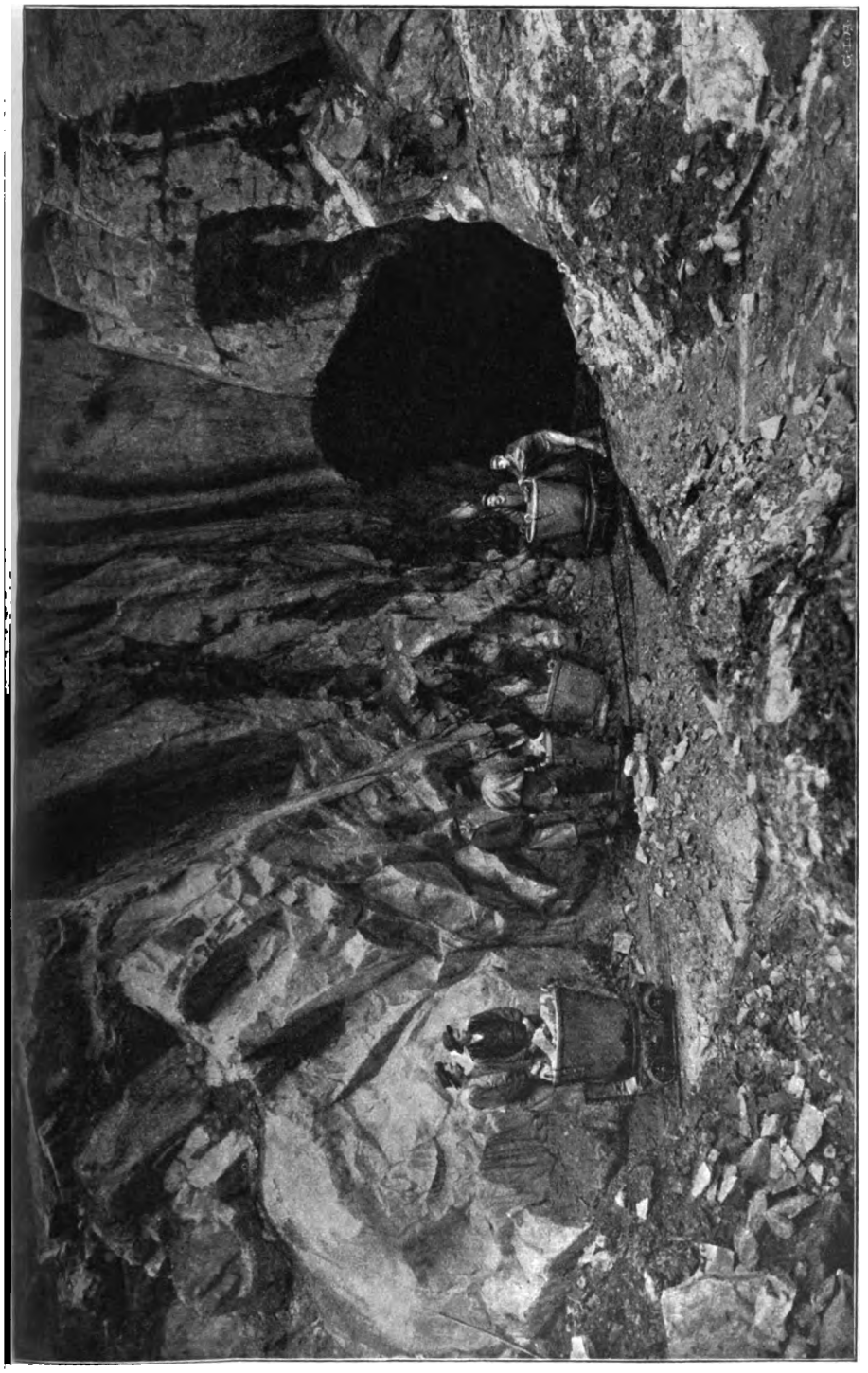

Photo. ALB. ANDERSSON, Karlskoga.

At Grängesberg.

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workman and year of 300 days, amounts to 1,000 à 1,600 cubic meters, or, estimated in weight, to 3,500 à 5,500 tons; and in driving galleries, the advance by the use of drilling machines is generally twice as fast as by hand-drilling when the same number of workmen are employed.

Methods of working. In regard to the working methods, as has already been intimated, *underhand stoping* is in most common use. Over 80 per cent of all the **iron ore** mined in Sweden is mined according to this method. It is, moreover, always used in its original form, or without filling. The excavations thus stand open, and their walls are supported by rock pillars and, where necessary, by more or less complicated timbering between the hanging-wall and the foot-wall. This method has been used since time immemorial, and it has always given good results both technically and economically. This has, of course, to a large extent depended upon the fact that both the iron ores and their country generally are of a very compact nature.

In the mines where this is not the case, the *filling method* has been resorted to during recent years; and the same change has also been introduced in some mines where the ore and rock are compact, but where the ore deposit has been very thick, and therefore mining in open places has made it necessary to leave large quantities of ore, especially at greater depths. Among the methods belonging to this class, *overhand* and *cross-working* are exclusively used, and their adaptation does not, on the whole, differ from the corresponding methods in use in other countries. The only more notable difference is the width of the stope when overhand working is used in mines with ores of a compact nature. In such cases the width of the stopes can rise to 12 or 15 meters, and sometimes, e. g. at Dannemora, up to 30 meters.

As to the general *effect of blasting* in our mines, experience shows that in stoping, overhand, and cross-work, the amount of rock broken down varies between 10 and 15 tons per kilogram of explosive, and between 2 and 3 tons per meter drilled. In favourable circumstances the former figure can rise to 20 or 25 tons, and the latter to 4 or 6 tons.

The coal-beds in Skåne, which, as has already been mentioned, lie almost horizontally, are intersected by stripes of schist, and, including these stripes, generally have a thickness of, at the most, 1 to 1·6 meter. The superincumbent country is composed of sandstone. The beds are generally worked by a combination of the pillar and stall method and of the double stall method. In the coal-field at Bjuf, long wall method has been exclusively used for several years. Now this method is used only in a part of this coal-field.

According to the aforesaid combined method, the coal-bed is divided into a series of pillars by a system of galleries, some of which are driven in the direction of the strike and some along the rise. The main galleries are driven by means of a stall 10—11 meters wide. As this advances, it is filled until only 2 meters of the width of the stall is left. At distances of 80 to 100 meters, rising galleries of the same width as the main gallery are driven from it, and from the rising galleries, stalls parallel with the main stall, thus forming pillars 60 to 80 meters wide and 80 to 100 meters in length.

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The cutting of the coal in the pillars is done by means of stalls which are driven parallel with the main stalls and with the same width as these. These stopes are afterwards entirely filled.

Ventilation and lighting. According to observations made in a large number of Swedish *ore-mines*, it is known that the temperature in them rises one degree centigrade for every 50 meters under the level (30 meters below the surface) at which the temperature is constant the year round, or the same as the mean temperature of the air above ground in that vicinity. In the deepest mines, the temperature rises up to 11 or 13 degrees Celsius, and in those of medium depth, 6 to 8 degrees. Since the average temperature at the surface in our mining districts varies between 3·7, 5, and 6 degrees, the natural ventilation caused hereby is sufficient to give due ventilation to most of the ore-mines in this country. Artificial ventilation is used only exceptionally, and is produced partly by centrifugal ventilators and partly by Harz-mine ventilators (HarzerWettersatz).

In *coal-mines* the air is exchanged to a large extent by means of natural ventilation, or on account of great difference between the temperature of the air on the surface and down in the mine.

The ventilation hereby brought about is not *alone* sufficient, however, to cause the necessary exchange of air, and is therefore supported by placing furnaces or, more usually, only an open fire at the bottom of the shaft, from which the bad air is to be expelled, or the air is warmed up by means of steam-injectors, or simply by steam-pipes. — The use of furnaces or open fires for ventilation is not accompanied by any danger, since fire-damp has never been observed to exist in the coal-mines of Sweden. Thus the costs of ventilation are almost none in the ore-mines, and in the coal-mines very slight.

For the **lighting** of the working-chambers down in the mines, open lamps are used both in ore-mines and coal-mines. As a rule, benzoline (gasoline), petroleum, or more seldom rape-oil, are burned in these lamps. Tallow candles are also used in some mines. In the mines which have electric hoisting-works, electric light is used, both on the surface and down in the mines.

Hoisting and pumping. The deepest iron mines have a vertical depth of hardly more than 350 meters, and as to other mines, only a few of them are more than 400 meters deep. In most of the mines the depth is less than 100 meters, or varies between 100 and 200 meters. The amount of rock and water which has to be hoisted out of each shaft is, furthermore, as a rule, very small, and consequently the hoisting and pumping machinery generally does not require engines of many horse-power. The power generally varies from 20 or 30 to, at the most, 80 or 90 horse-power. At the largest ore-fields, however, still more powerful hoisting engines and pumps are used.

The shafts are generallly perpendicular, some of them are rectangular and some circular. The area of the horizontal section of old shafts runs up to about 40 sq. m. The modern shafts are, as a rule, rectangular, and their greatest section-area is 18 to 20 sq. m. The influx of water is, as has already been implied, very small. As a rule, it amounts, at the most, to 200, 300, or 500 liters per minute. For removing the water from the smaller mines, suction and lift pumps are used; in the larger mines, plunger pumps, the pressure-height of the latter being generally 150 meters, once in a while 200 to 220 meters.

The transportation of the coal down in the **coal-mines**, if long, is executed by means of horses of small breed or by traction machinery. The hoisting and pumping machinery is much stronger in the coal-mines than in the ore-mines.

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The influx of water into the former is also much greater than into the latter. In some mines it amounts to 40 or 50 hectoliters per minute. The volume of coal, etc., hoisted per shaft is also much greater than in the ore-mines. The shafts are everywhere perpendicular, and at the most 100 meters deep.

Picking, cobbing, and washing. At our iron-mines, the separation of the ore from the waste is in many places done in one operation, or simply by hand-picking. If, on the contrary, the ores are much mixed with deads of different kinds, the separation is done in several operations, partly by hand and partly by the aid of machinery. For magnetic iron ores it is customary to use magnetic separators, namely, for coarse ore, Wenström's and Forsgren's, and for finely pulverized ore, principally Gröndal's and Forsgren's. The largest magnetic separating works are at Grängesberg, Blötberget, Bredsjö and Herräng. At Bredsjö and Herräng there are also briquette-furnaces, of the Gröndal system, in which the finely pulverized ore is made into briquettes suitable for smelting-furnaces. For non-magnetic iron ores wet enriching methods (washing) are used in several places, such as Åsboberg at Striberg, Långban etc.

In zinc, lead, and silver mines, washing is common. The largest of these works are those at the Åmmeberg zinc mines. Next in order come the washeries at the Kafveltorp, Stollberg, Ryllshytte and Rävåla zinc mines, the Sala lead and silver mines, etc.

In the **coal-mines** the sorting of the coal from the deads (schist and sandstone, etc.) is done down in the mines. The same is the case with the fire-proof clay, which is excavated together with the coal.

Surveying of mines. Surveying with the *theodolite* is, as a rule, not very common. This method is principally resorted to at the larger ore-fields, and only for surveying a larger or smaller number of fixed points on the surface or down in the mine. For further detail-surveying between these fixed points, the Swedish surveying method (*Svenska Markscheidermetoden*) is used.

This method of surveying, which is neither known nor used in any other country, has here been in use for 270 years, and has always given very satisfactory results. The surveying-results may be considered especially good, since, during the last 30 years, a number of improvements have been made in the surveying-instruments, and since steel measuring-tape has begun to be used in all more important length-measurements. This method is also much more convenient than surveying with theodolite, especially with the configuration which the working chambers in our mines generally have.

According to the regulations of the Swedish Mining Act of May 16, 1884, all plans and sections of ore-mines must be drawn on a scale of 1 : 800, and must be made in conformity with a *Normal Map*, drawn up by the Mining Department («Bergsöfverstyrelsen»). Consequently all shafts and other excavations must be shown on the plans. Further, both the parts of the excavation where ore of different kinds occur, and those occupied by the country, gangues, dykes, etc., must be distinctly marked with certain specified colours. Contrary to the rule in other countries, it is decreed that no more than *one* horizontal section may be drawn on each sheet, and this rule has been followed in Sweden ever since mine plans first began to be drawn up, 270 years ago, or in 1629.

The mine plans made in this way give a very clear and exact idea, not only of the configuration of the excavation, but also of the mode of occurrence of the ores contained in the mine, and, for that matter, everything pertaining to the geological conditions of the mine.

According to the Mining Act, it is also decreed that all mine plans must be drawn in duplicates. One of these copies is to be kept at the mine, and to be

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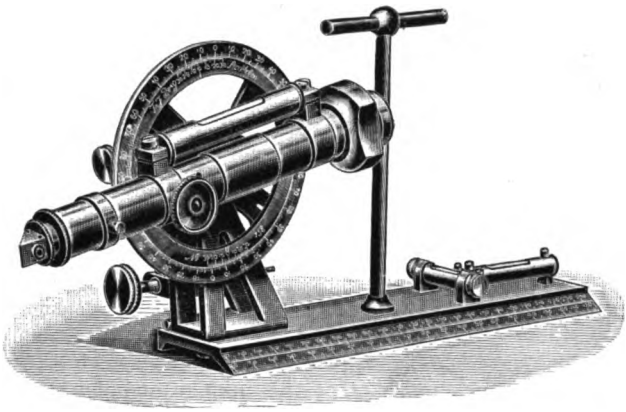
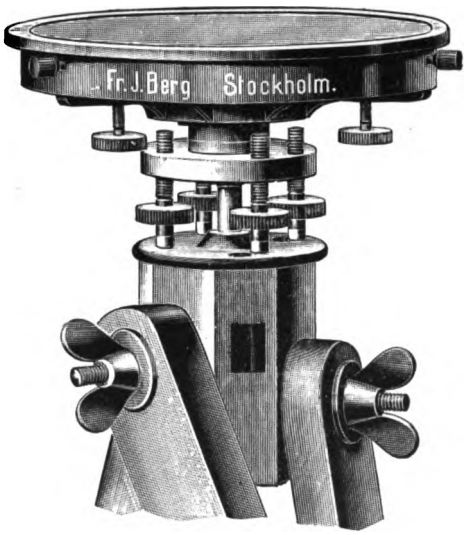
produced to the State Mining Official on demand; and the other is to be forwarded to the *Office of Mine Maps*, a division of the Board of Trade at Stockholm, where there is thus deposited a complete collection of all the mine plans in the country — a collection quite unique, no other country having anything similar. It is also prescribed that in all mines which are being worked every new piece of work must be surveyed and mapped, at the latest, before the end of the year after it is begun, and it is the mine-owner's duty to forward these supplementary surveys to the Office of Mine Maps, whereby the collection of plans at this office is fully supplemented from year to year, and kept exactly like those preserved at the mines.



Mining Alidade.

In order still better to illustrate the geological and other conditions of the mines, it has for a long time been usual to make *models* of the mines; but it is only during the last thirty years that these models have been carried out in a manner fully suitable for the purpose. The models are of two types.



Mining Plain Table.

When a model is to be made of a mine with, at the most, 6 to 8 levels, the contours of the working areas and the geological conditions of each level are painted in oil-colours on glass plates, all in conformity with the normal map. Then these glass plates are placed one above the other, and at a distance from each other exactly in proportion to the distance between the different levels represented, and so that each glass will have a perfectly exact position in relation to the others.

If, on the other hand, a model is to be made of a mine with a larger number of levels, the aforesaid type of mine-models cannot be used, but then the following method must be resorted to. The different levels are cut out of stiff white pasteboard, on which the ores, etc., are marked with the respective colours. Then these sections are fastened on squares of wire stretched on wooden frames, which are placed the one over the other so that each will have its exact position in relation to the others.

Both of these model types are very practical, and give a clear idea of the position of the working areas in relation to each other, the mode of occurrence of the ore, and the other geological conditions of the mine.

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For the **coal-mines** the same surveying-methods are generally used as in other coal-producing countries. Maps of coal-mines shall be made on a scale of 1 : 1,500, and, furthermore, the same provisions and regulations apply to these as to the ore-mines, as specified above.

Mine legislation.

Ore mines. According to the Mining Act of May 16, 1884, every Swedish subject has the right to take out a concession of mineral deposits which contain: *a*) the ores of the following metals, viz. gold, silver, platinum, quicksilver, lead, copper, iron with the exception of lake and bog ores, manganese, chromium, cobalt, nickel, zinc, tin, titanium, molybdenum, wolfram, bismuth, arsenic, and antimony; *b*) sulphur pyrites, magnetic pyrites, and graphite; — providing that these mineral deposits are situated at a distance of less than 200 meters from dwelling-house, building-lot, or garden

The claim-holder has a right to do prospecting within the bounds of the claim, which embraces a circle with a radius of 100 meters. The owner of the ground is entitled to a half-share with the owner of the mine, in the work and the profits arising therefrom. When the deposit is laid open, a certain area 200 meters square is assigned within which the owner of the mine has exclusive right to work. The boundaries of this area extend downward vertically.

A certain amount of work is to be done yearly on the said area; if not, the rights are forfeited, and the deposit then may be subject to a new claim.

Coal-mines. Coal-deposits cannot be acquired as ordinary claims. The right to explore and work such deposits is granted by the King by special concession. The boundaries extend downward vertically. Such a concession may not embrace more than one thousand six hundred hectares (about 4,000 acres). The holder of the concession is obliged to pay a certain annual royalty to the owner of the ground, and shall, besides, do a certain amount of work on the concession.

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2. THE IRON AND STEEL INDUSTRY.

For centuries the iron production has been one of the most important industries of Sweden, and Swedish iron is renowned for its excellent quality. The cause of this is the existence of large deposits of pure ore and that charcoal has been, and is still, the only fuel used in the process of making pig iron.

As long as charcoal was exclusively used in all countries in the process of making pig iron, Sweden held a very prominent position in the iron production also as regards the *quantity* produced. About 1730, coke was beginning to be used for this process in England, but for the refining, charcoal was used to the close of the 18th century, when a new process of refining (puddling) was invented, in which fossil coal was used. Possessing very little of fossil fuel, Sweden has not, after this change of things, been able to take part in the new mass production, but is now furnishing iron only of the best *quality*, by reason of its pure fuel, free from sulphur.

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Up to the early part of the 19th century, Sweden still produced nearly 10 per cent of all the pig iron production in the world, but this proportion has been greatly diminished by the conditions just mentioned. The figures attached will give an idea of the state of our iron industry during the last generation; in order to obtain a better view of the same the mining of ore is here presented as well as the production of pig iron and ingot metal (steel).

	Production of Sweden; metric tons.			Sweden's percentage of the world's production.		
Average.	Iron ore.	Pig iron.	Ingot metal.	Iron ore.	Pig iron.	Ingot metal.
1866/70	553,759	267,854	8,220	2·21	2·45	1·48
1871/75	795,263	332,456	17,144	2·89	2·35	1·28
1876/80	726,712	357,224	27,465	2·05	2·36	0·88
1881/85	877,408	429,377	63,763	1·91	2·08	1·07
1886/90	932,470	446,578	122,289	1·81	1·84	1·20
1891/95	1,519,325	471,147	173,465	2·76	1·76	1·27
1896/00	2,294,760	517,796	274,374	2·97	1·41	1·16
In 1900	2,609,500	526,868	300,536	2·96	1·28	1·09

Our percentage of the world's total pig iron production has thus gone down as early as in the middle of the sixties to 2½ per cent. We have maintained our position in regard to the steel manufacture, which gives additional evidence as to this entire industry of ours more and more becoming specialized to the highest qualities.

The problem set before us with regard to our iron industry is evidently how we shall be able to bring about *a manufacturing industry on a large scale.* As is generally known, the hope is entertained in

TABLE 101. *The Iron production of Sweden, in 1876/1900.*[1] Metric tons.[6]

Average for the years	Pig iron.[2]	Castings from blast furnace.	Unwelded blooms.[3]	Bessemer metal.	Martin metal.	Crucible ingot metal.	Unrolled blister steel.[4]	Bar iron.[5]
1876/80	350,414	6,810	112,187	21,608	3,443	2,414	·	213,163
1881/85	423,176	6,201	151,184	47,976	14,077	1,710	·	262,194
1886/90	441,876	4,702	205,945	73,102	47,489	1,698	·	260,434
1891/95	465,141	6,006	215,770	88,089	83,981	598	797	276,370
1896/00	510,004	7,792	192,147	101,403	171,123	931	920	320,670
In 1896	487,147	7,271	188,396	114,120	142,301	604	624	321,615
» 1897	530,893	7,304	189,632	107,679	165,836	691	922	309,715
» 1898	523,960	7,806	198,923	102,254	160,706	1,013	1,148	306,348
» 1899	489,231	8,496	195,331	91,898	179,357	1,225	974	335,706
» 1900	518,787	8,081	188,455	91,065	207,418	1,121	932	329,965

[1] Except certain black-work and manufactures. — [2] In the rest of the Tables and in the text, the following column (castings from blast furnace) is also included under the head of pig iron. — [3] Including puddle bars. — [4] In the rest of the Tables and in the text, where not otherwise stated, Bessemer, Martin, and Crucible ingot metal are comprehended in the designation of »ingot metal (steel)». Unrolled Blister steel might also here be included, which, however, has not been done in the official Mining Statistics for later years. For 1876/90 unrolled Blister steel is included in Crucible ingot metal. — [5] Bar iron in its widest sense, thus including charcoal blooms and billets, not specified shapes, merchant-bars as well as wire rods in coils, and tube billets. — [6] A 2,204 *lbs.*

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this respect of being able to make use of electricity; all over the world, and not least in Sweden, diligent endeavors are made to solve this problem.

A **general view of the iron industry** of Sweden during 1876/1900 is given in the Table on the preceding page. As to head entries, general views relating to earlier times are given in the following pages under their respective divisions.

As to the **export** of iron and steel, unwrought or only partly finished, we are informed by the commercial statistics that the same has amounted in value as follows: [1]

Year.	Million kronor.	Year.	Million kronor.	Year.	Million kronor.	Year.	Million kronor.	Year.	Million kronor.
1871	34·06	1877	29·98	1883	38·82	1889	39·60	1895	32·05
1872	52·07	1878	28·38	1884	42·49	1890	36·05	1896	34·52
1873	49·24	1879	30·79	1885	34·11	1891	32·13	1897	33·98
1874	39·09	1880	41·01	1886	31·65	1892	31·69	1898	34·81
1875	41·52	1881	39·00	1887	32·84	1893	28·03	1899	42·20
1876	31·63	1882	40·55	1888	29·28	1894	25·96	1900	49·90

The averages of the five-yearly periods, from 1871 to 1900, are respectively 43·19, 32·35, 38·89, 33·88, 29·97, and 39·08 million kronor. These figures are by no means gratifying. The maximum was attained in 1872 — thirty years ago.

The imports of unwrought iron and steel has during the same time varied very little, and has generally amounted to 3 or 4 million kronor yearly.

During the first part of the nineteenth century, pig iron was chiefly produced and from this, by refining in charcoal-forges, soft iron, which was to the largest part exported as bar-iron to foreign countries to be there converted into steel and manufactured into finer articles. In the latter part of the nineteenth century, on the other hand, the iron industry has in Sweden as well as in other countries made very great technical progress. Thus, many technical improvements have been made in the process of making pig iron, and new refining processes, such as Bessemer and Open hearth, have been introduced.

The foreign soft basic ingot metal has, however, been a rather sharp competitor to the Swedish iron refined in charcoal forges, the production of which consequently has been reduced, but on the contrary the manufacturing of the excellent Swedish ingot metal has rapidly progressed; of this the home and foreign expositions, in which the larger Swedish iron works, such as Domnarfvet, Uddeholm, Bofors, Finspång, Nykroppa, Söderfors, Iggesund and others, have taken part, bear ample witness.

Concerning the **method of production** of different kinds of iron, an historical account is here given, the extensiveness of which, compared with the treatment generally devoted in this work to technical ques-

[1] A krona = 1·10 shilling or 0·268 dollar.

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tions, may be justified by the fact of the iron industry in all time having been of great interest to our country, no less from an economica point of view than from the consideration of the technical development of our people.

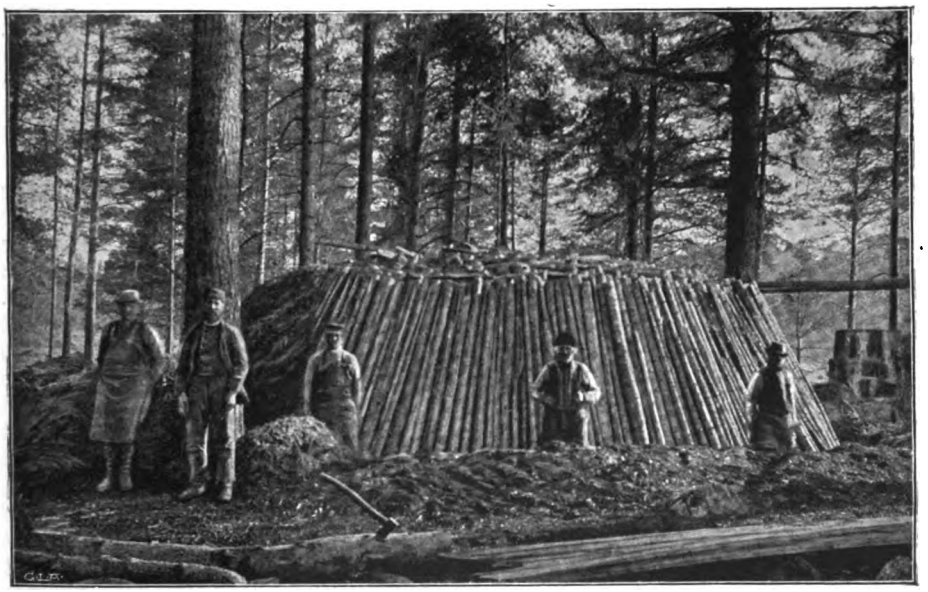
Before proceeding to this, however, we must devote some atten tion to the question which, as shown above, has excercised a deciding influence on the development of our iron industry, namely the *fuel* question.

Fuel.

The fuel used in our iron production is principally charcoal and wood, while fossil coal and coke, as also peat and peat-coal, are less in use.

Wood is used in the Swedish production of iron in heating furnaces, often mixed with peat or coal, in the producers for Open hearth furnaces, in puddling furnaces, and in the making of blister steel.

Charcoal. All pig iron and iron refined in forges is made exclusively with charcoal. This charcoal is produsedprincipally in charring-stacks in the forests, but also in charring-kilns at the iron works. There are also along the coast in the northern part of the country a large number of saw-mills where charcoal is made from the waste-wood, also by burning in stacks. This so called saw-mill charcoal is transported in vessels and by rail to the central part of Sweden, where the principal iron industry is carried on.



Charcoal stack with wood ready stacked.

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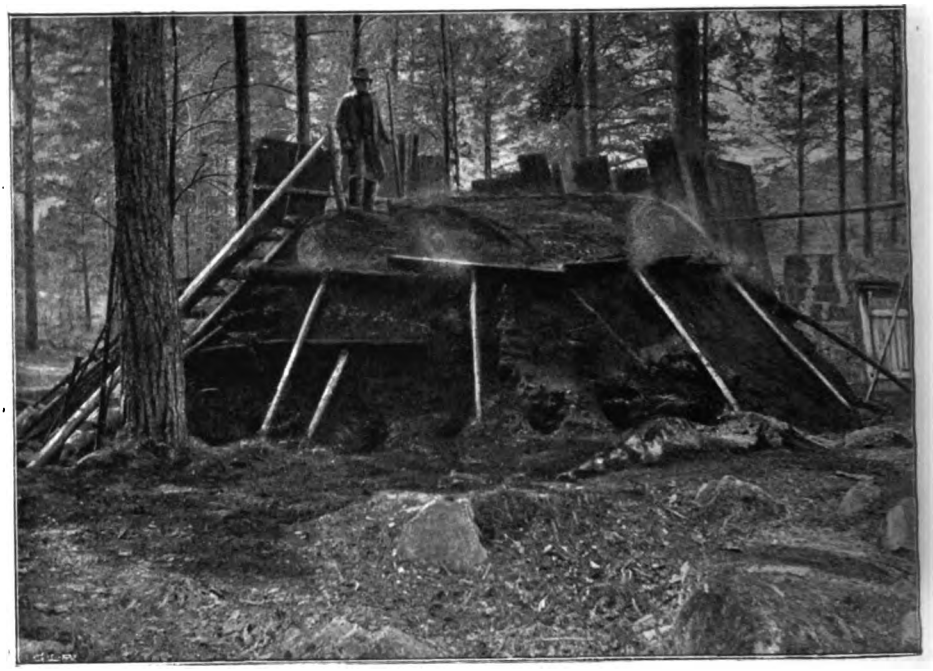

Charcoal stack in operation.

The reason why charcoal is generally made in the forests in charring-stacks is that the charcoal can easily be transported on sledges in winter without its being necessary to make any expensive roads. In places where a larger quantity of charcoal-wood can be floated to the iron works, kilns are most suitable for charring the wood.

Burning in stacks is done either in vertical or horizontal stacks. There is no real difference between them, except that consequently the wood in the former is piled on end, in the latter laid horizontally.

Burning in a Swedish **vertical stack** is done as follows: The wood to be burned, which consists of spruce and pine, is in wintertime cut into lengths of 2·5 meters, partly barked, piled in small open stacks, and left to dry during the summer, but is not burnt until the next autumn or winter. The place for the burning-stack is chosen where there is plenty of wood, in order that many piles may be burnt on the same bottom, since a charring stack on a new bottom never burns evenly, and therefore produces less charcoal than on an old bottom. Furthermore, the earth should be dry and well leveled and free from stones and roots. In the center of this stack-bottom some logs or wood are placed in a circle, which is piled in such a way that a narrow vertical shaft or drum is formed, in which the lighting of the stack takes place. The placing of the wood is then continued in circles around the drum, care being taken to place the smallest and driest wood near the center and the outside of the stack, the coarser wood being placed between, and the big ends of the logs resting on the ground. Thus, the outer wood will lean towards the center of the stack, which has the form of a truncated cone.

On the top of the stack small wood and twigs are laid in such a way that the upper part of the wood-pile obtains a convex form. The wood having thus been piled, the whole stack is covered with spruce twigs, and in order to keep this

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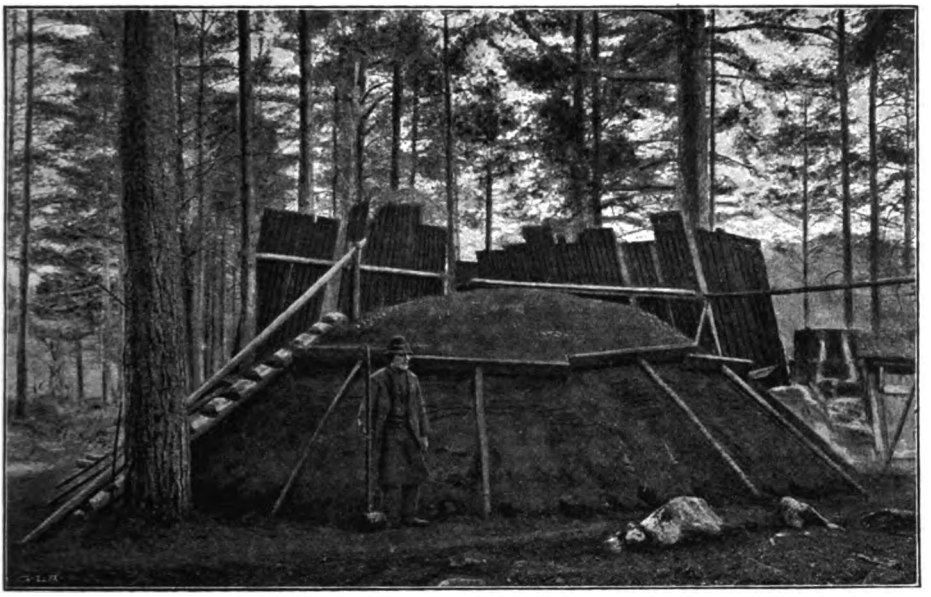

Charcoal stack completely charred.

in place, the twigs are put in between the wood, beginning at the bottom or foot of the stack and continuing upwards.

Then the twigs are covered with a layer of charcoal-dust and sand, which is kept in position by means of narrow boards or split-wood, held by supports from the ground. The figure on p. 710 shows the stack with its outer covering in burning. The lighting is done either with charcoal or dry wood. In the former case, glowing coals are dropped through the drum to the bottom of the stack, and then the drum is filled with charcoal and the opening at the top is closed. From time to time the drum is opened, and as the charcoal is consumed wood is put in its place, and this is continued until the upper part of the stack becomes burned; during the whole time only a few holes for the draught are kept open at the foot of the stack to let in the air necessary for combustion. Afterwards holes are opened at the upper edge of the side of the stack in order to let out the smoke, which are again closed when the burning of the wood has reached it, and new smoke-holes are then opened further down; in the same way the work is continued to the foot of the stack, where the burning is finished. If the stack be lit with wood, this should be fully dry and chopped fine.

The principle of stack-burning is that only so much wood is burnt in the stack during the charring as is required to dry the wood, evaporate the water, and decompose the wood, and also that no escaping gases are allowed to pass through already fully charred coal, as these would thereby be partially consumed and become softer.

By the smoke escaping from the smoke-holes, the charcoal-burner judges what part of the stack is charred, but he observes it still better from the resistance made by the inside when an iron rod is inserted into it; if this is easily done the wood is charred, otherwise not.

When the wood is charred, its volume decreases, the stack becomes smaller, which is clearly demonstrated in the above figure, which shows the stack completely charred, compared with the figure on the foregoing page.

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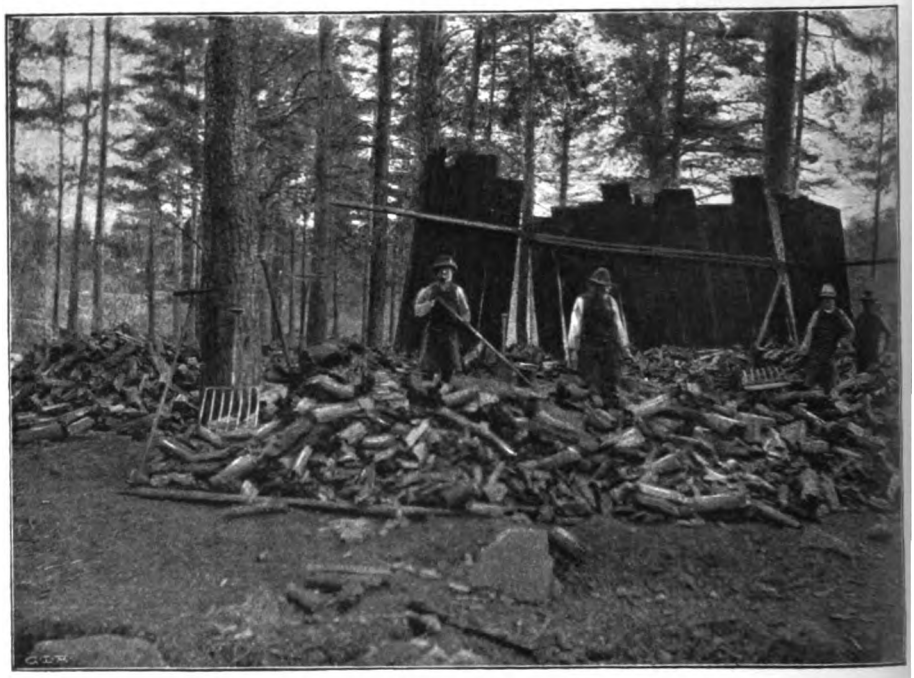
When the burning is completed, the charcoal is taken out a little at the time, care being taken to sprinkle the charcoal in case it, when exposed to the air, should catch fire, and the charcoal is collected in a ring around the bottom of the stack.

The charcoal ought to be left in this way at least eight days in order to avoid danger of catching fire when transported into the storage-house; it is often collected in a heap, close to the bottom of the stack, and is then covered and kept there until the road allows transporting it.

An ordinary stack is 15 meter in diameter, and is burnt in four weeks. From 30 hectoliters of wood piled in the stack, one »stig» — 20 hectoliters — of charcoal is produced.



Charcoal stack after burning.

During the piling and raking out, as well as during the first week of the burning, 2 men are required, but during the remaining time only one.

Horizontal stack. The bottom of this stack is rectangular, the length of the wood 6 to 7 meters, and it is piled in such way that the length of the wood measures the width of the stack. The stack is covered with spruce-twigs and sand, after which the charring is conducted on the same principle as for the vertical stack.

Charring in kilns is practised only at a few iron works. The kilns, built of common bricks, are of a very simple design. Their capacity is 2,600 cubic meter, their shape a parallelopiped with arched roof and brick bottom. Below the bottom is one or two fireplaces, from which the gases by means of channels enter into the wood through 4 to 5 openings in the bottom. By means of the gases the water is expelled, the wood dried and charred, and the gases escaping from the furnace are pulled out at the bottom of the furnace by means of draught

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from 2 wooden stacks or brass-pipes placed on the outside, one on each side of the ends of the kiln. For the charging of the kiln there are 2 or 3 openings at different heights, provided with iron doors. The wood having been charged, which requires about 3 days, the firing begins.

While the wood is drying, a considerable quantity of steam escapes, and in order to give vent for the same the upper door is kept open, but afterwards shut, and the firing is continued until the escaping smoke from the drums is thin and blue and has a tendency to burn. The fire-place is then closed up with masonry and the furnace allowed to cool during 16 days, when it is opened and the charcoal taken out. The whole process lasts about 40 days, and of the 2,600 cubic meters of wood charged, 90 »stigs» of charcoal are obtained.

For the firing, about 10 per cent wood is consumed. The charring in kilns gives a somewhat larger percentage of charcoal than burning in stacks, but the charcoal is considered to have somewhat less heat and not to be fully as well burnt. The Managing Director of Stora Kopparbergs Bergslag, Mr. *E. I. Ljungberg*, has designed charcoal kilns of quite a different type, used at the Domnarfvet Iron Works. These kilns fitted with fireplaces, are built in a row, only separated by walls, and connected with each other by flues and valves, in such a manner that when one of the kilns is heated the steam and gases pass into the next kiln to dry the wood in it, and when this wood is dried, the firing commences in this kiln, and the gases from this are allowed to pass into the third kiln, etc., the whole thus forming a continuous furnace system. The cost of labour is low, the amount of wood used less, and the coal produced of about the same quality as the coal charred in kilns generally.

Fossil coal. The Swedish fossil coal is unfit for coke making, and has not been used in the iron industry. The fossil coal here used for producers, etc., is consequently imported.

Coke. In Sweden there is only one coke works, at *Islinge* near Stockholm, which makes coke from imported fossil coal. The works have 30 coke-ovens of Coppée's system, and washing-works, the machinery of which is worked by gas from the coke-ovens. The yearly output is 20,000 tons of coke, which is consumed within the country in cupola-furnaces and for other purposes.

An account of our **Peat industry** is given later on in the section headed Manufacturing Industry. Peat is used in our iron industry exclusively in ovens for Open hearth and heating furnaces. *Peat coal* has not yet been brought into use, either in the pig iron production or in refining in hearths on account of its producers high percentage of phosphorus.

Pig iron.

The production of *pig iron* in the principal countries from 1871 is given in Table 102 (p. 715), and a diagrammatic chart of this production in Sweden from 1866 is presented on page 721. Some statistical details, serving to show the technical and economical condition of the same, are given in Table 103. From this the number of blast furnaces is seen to have decreased from an average of 222 for 1861/65 to only 135

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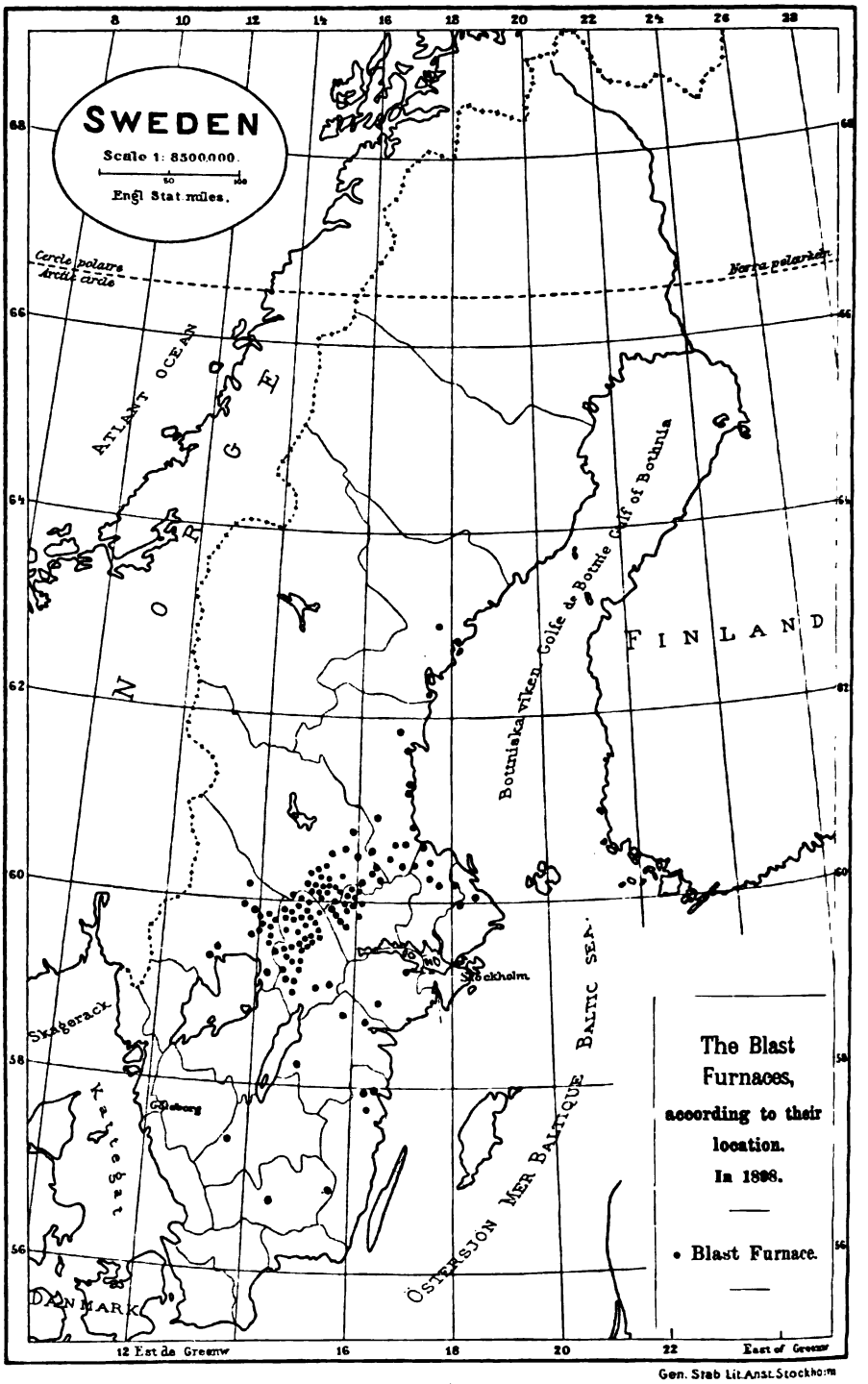

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TABLE 102. *World's production of pig iron.* Metric tons à 2,204 *lbs.*

Countries.	Average 1871/75.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1900.
Sweden	332,456	429,377	446,578	471,147	517,796	526,868
Great Brit. and Irel.	6,561,822	8,227,085	7,883,201	7,360,536	9,002,201	9,052,107
Belgium	589,353	719,761	780,874	766,098	1,006,317	1,018,507
Germany	1,945,661	3,410,516	4,214,549	5,081,844	7,446,096	8,520,540
Austria	315,961	475,247	573,299	686,432	931,868	1,000,207
Hungary	152,966	185,426	233,889	322,622	443,507	455,558
France	1,264,637	1,899,406	1,692,741	2,006,291	2,524,993	2,669,424
Russia	388,702	493,421	695,498	1,184,515	2,241,721	2,874,988
United States	2,284,265	4,369,914	7,192,581	8,263,142	11,675,808	14,009,869
Other countries	335,271	476,890	569,165	607,778	895,686	1,190,411
Total	14,171,114	20,687,043	24,282,375	26,750,405	36,685,993	41,348,479

for 1900, while on the contrary the output per blast furnace has increased from 923 tons to 3,903 tons, and per diem from 6·68 tons to 13·81 tons. The output per blast furnace has since 1833 increased nine times, and per diem five times.

Of the total *pig iron production* of Sweden during 1896/1900, the average percentages for the different Läns were: Kopparberg 26·46 %, Örebro 25·74 %, Gefleborg 13·98 %, Vermland 10·79 %, Vestmanland 10·03 %, Uppsala 5·05 %, Östergötland 3·27 %, Vesternorrland 1·62 % and Kalmar 1·49 %; the remaining 1·57 % were divided on the Läns of Stockholm, Södermanland, Jönköping, and Kronoberg. The average output per diem is highest for the Domnarfvet Iron Works, in the Län of Kopparberg, this in 1901 having amounted to 46·83 tons per furnace.

More than 80 % of the pig iron production in Sweden is used for manufacture within the country. The *exports* are given in Table 104. As shown there, Sweden also *imports* quite considerable quantities of pig iron, which is consumed by the foundries.

The consumption of pig iron in Sweden amounts at present per inhabitant to about 96 kilograms a year, which is a very high figure as compared with the average for Europe being only about 70 kilograms. Still the consumption in our country shows very little increase of late, — quite a peculiar feature.

The pig iron **production** has in course of time undergone considerable changes. An historical account of these is likely to be of greater interest regarding our country than any other.

In most ancient times, wrought iron was always made in Sweden as in other countries direct from the ore. The first more known method used for this work was the **blast forging** (blästersmide). The blast forge (see the figure p. 717) was about 2 meter high, the hearth of which was rectangular and the shaft round and widening upwards. The ore was lake ore and the fuel wood, with which the small shaft was filled. When this wood had been charred, a certain quantity of ore was charged, and then the blast by means of small bellows was put on. When the charcoal was consumed, a lump of iron and some slag rich in iron were left

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TABLE 103. *The Pig iron production of Sweden.* Metric tons à 2,204 *lbs.*

Year.	Production. Tons.	Average for the years	Production. Tons.	Average for the years	Blast furnaces in operation.	Total number of days of work.	Production. Tons.[2]	Production. Tons. Per Blast furnace.[3]	Production. Tons. Per diem.[4]
1636[1]	406	1808	73,100	1861/65	222	30,678	204,826	923	6·68
1650	10,400	1810	54,000	1866/70	212	35,431	267,854	1,263	7·56
1660	22,600	1836/40	117,000	1871/75	215	40,545	332,456	1,546	8·20
1665	22,100	1841/45	122,000	1876/80	195	37,654	357,224	1,832	9·49
1681	44,500	1846/50	137,000	1881/85	186	41,777	429,377	2,308	10·28
1747/50	33,000	1851/55	159,000	1886/90	159	38,790	446,578	2,809	11·51
1790	78,000	1856/60	177,000	1891/95	150	38,158	471,147	3,141	12·35
1801	77,000			1896/00	141	38,834	517,796	3,672	13·33
1805	79,400			In 1900	135	38,148	526,868	3,903	13·81

on the bottom of the furnace. This lump was removed by means of a pair of tongs and forged. — Iron produced by this method was generally known during the twelfth and thirteenth centuries far beyond the limits of the country by the name of *Osmund iron.*

During the fifteenth century these furnaces were made higher, and the shaft was narrowed towards the top; instead of lake ores hard ores began to be used, and charcoal took the place of wood. The heat was increased, the reduction was more complete, and an iron higher in carbon and more fusible was obtained, which could be tapped from the furnace. The furnaces could be worked continuously, the consumption of fuel decreased, the iron in the ore was more completely extracted, but still the iron received had an entirely different character, wherefore both the furnace and the iron were given special names; the former was called »*masugn*» (blast-furnace), and the latter »*tackjärn*» (pig-iron). This pig iron was afterwards by refining converted into wrought iron, which in the older furnaces was obtained direct.

This principle of first preparing pig iron from the ore, and then wrought-iron and steel from the pig iron by means of an oxidizing melting process in the forges or the furnaces, has during the following centuries up to the present time been the same, although, as has already been stated, great improvements have been made both in the production and the refining of pig iron. A detailed description of the Swedish method of producing iron will be given in the following pages.

During the 14th and 15th centuries, **blast furnaces** took the place of blast forging for the production of pig iron. These furnaces were in construction somewhat similar to the blast forges. The lower part of the furnace was built of granite, but the outside of the upper part, of timber, and in the space between this and the shaft was a filling of earth and sand. The height of the furnace was only 7 meters.

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[1] Besides 3,500 tons of Osmund iron. — [2] Here are also included the comparatively small quantities of castings direct from blast furnace (see Table 99, p. 643), which are not included in the relative figures of the two following columns. — [3] Corresponding figures amounted in 1833 to 434 tons, in 1838 to 478, in 1843 to 571, in 1848 to 622, in 1853 to 624, and in 1858 to 678 tons. — [4] Corresponding average amounted in 1833 to 2·78 tons, in 1838 to 3·17, in 1843 to 3·78, in 1848 to 3·96, in 1853 to 4·59, and in 1858 to 5·89 tons. — [4] Per blast furnace and per diem.

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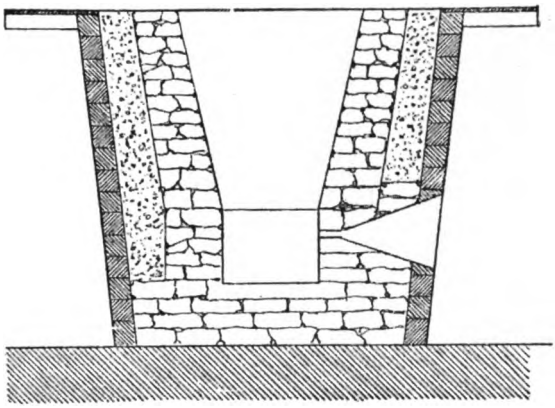
The **blast furnaces** were built near small water-courses (small rivers or streams), which, however, only for a short time during spring and summer furnished sufficient water-power to run the bellows for the blast used for the furnace. As in the blast forge, the hearth of the blast furnace was rectangular and the balance of the furnace shaft of a circular form.



Old-fashioned Swedish blast forge (see p. 715).

At first only lake and bog ores were used in the blast furnaces but later also hard ores. The old blast forges were, however, only gradually exchanged for blast furnaces as both kinds were simultaneously in use for nearly two centuries. As late as at the end of the 18th century blast forging was still carried on in the more remote forest districts of Dalarne.

Technically the production of pig iron made very slow progress. Although the height of the blast furnace was somewhat increased and timber walls substituted by stone walls, the shape of the shaft and the material of which it was built, the blowing-machinery, etc., remained about the same up to the year 1830. The figure on the next page shows a Swedish blast furnace from this period. It is only about 11 meters high which was then the usual height. At that period, however, several important improvements were made. Hot blast came into use, the stack was built of fire bricks instead of stone, and the lower part, i. e. the hearth, rammed with a material consisting of quartz and a little fire clay.

These rammed hearths were very durable, whereby the run of the blast furnace was prolonged. But a more important improvement, however, was introduced in roasting the ores. Previously this had been done in roastingstalls, which now were exchanged for kilns fired with wood or gas from the blast furnace. These kilns were more and more improved, until Mr. *E. Westman*, Director of »Järnkontoret» (see p. 761), in 1850 introduced his well known type of roasting kiln of a very perfect design, which has greatly contributed to the excellent quality of the Swedish iron.

TABLE 104. *Imports, exports, and consumption of pig iron in Sweden.*

Metric tons à 2,204 *lbs.*

Average for the years	Mean population.	Production. Tons.	Imports. Tons.	Exports. Tons.	Surplus of exports. Tons.	Consumption. Tons.	Consumption. Kilog. per inhab.
1861/65	3,993,000	204,826	5,533	14,212	8,679	196,147	49
1866/70	4,166,000	267,854	4,530	24,280	19,750	248,104	60
1871/75	4,274,000	332,456	13,436	54,320	40,884	291,572	68
1876/80	4,500,000	357,224	15,900	35,973	20,073	337,151	75
1881/85	4,605,000	429,377	20,050	53,093	33,043	396,334	86
1886/90	4,742,000	446,578	25,515	59,205	33,690	412,888	87
1891/95	4,832,000	471,147	28,027	66,766	38,739	432,408	89
1896/00	5,032,000	517,796	47,233	82,781	35,548	482,248	96
In 1900	5,117,000	526,868	50,932	84,477	33,545	493,323	96

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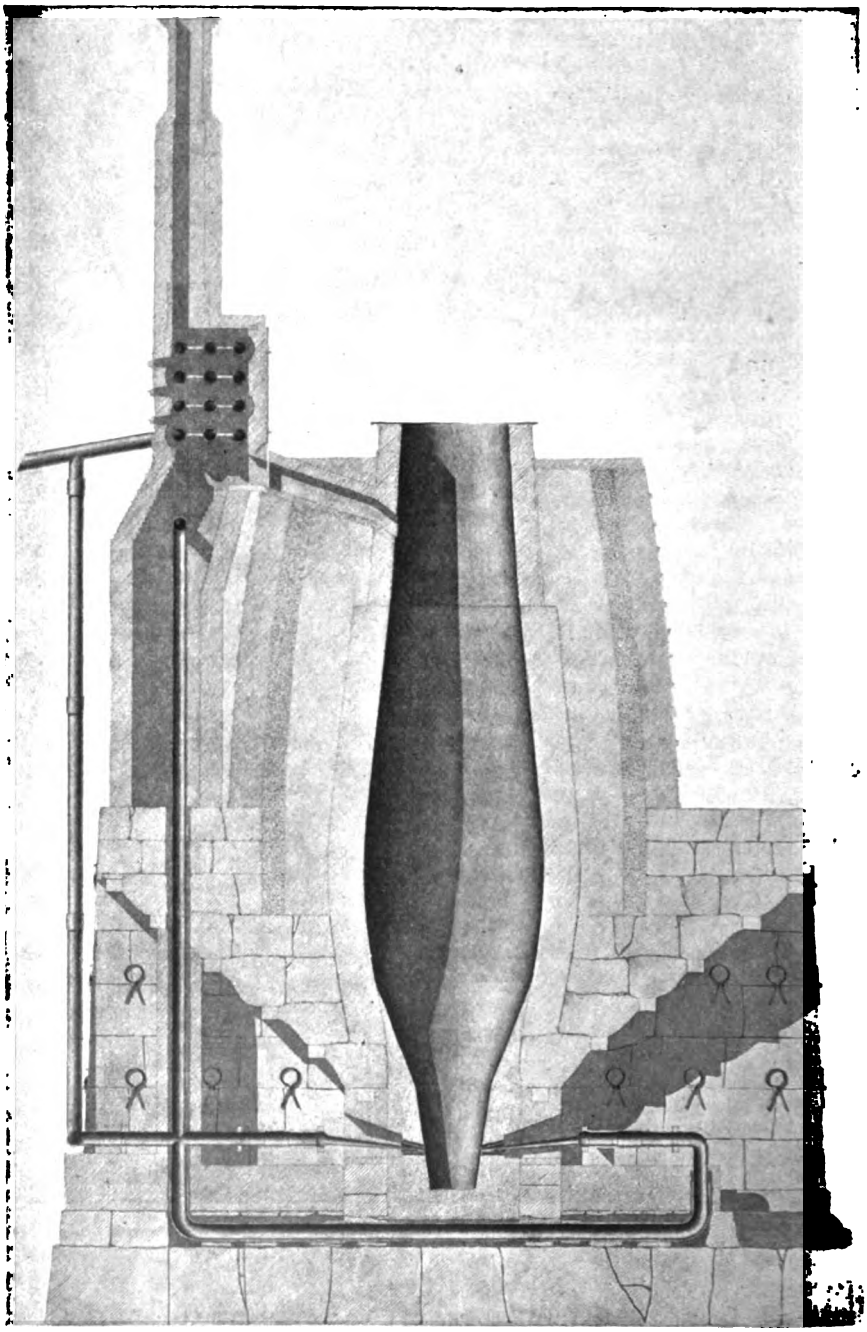

Old fashioned Swedish blast furnace.

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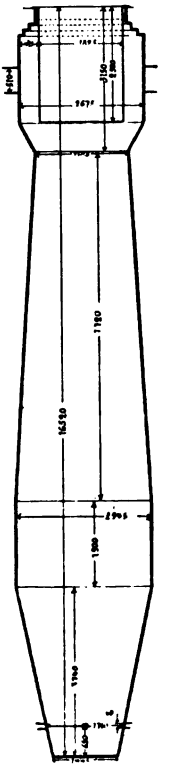
From 1850 to 1860, several improvements were made in the construction of blast furnaces. Up to that time the building material used was slate and granite, which, however, necessitated heavy walls, and the whole structure preferably to be built in a parallelipipedical shape. As the height of the blast furnace was increased a lighter construction was desirable, and for that reason only the lower part was, as previously, built of cut stone while the upper part was all made of brick and of a round shape.



When the blast furnaces were made larger and the hearths wider, it became necessary to increase the number of tuyeres in order better to distribute the blast in the furnace. The older blast furnaces had only one tuyere, which was afterwards, the fifties, increased to two or three; a larger number could not suitably be applied in a furnace of a rectangular section. On account of this, the stacks in 1870/80 were placed on beams resting on cast iron columns or trestles, as had been customary for some time at the foreign coke furnaces. The first blast furnace of this construction was built in this country in 1876. The number of furnaces of this type has since been steadily increasing, although not very rapidly, as this design could be adopted only when a new furnace was erected, but at present, however, the greater number of Swedish blast furnaces are of this type. In these blast furnaces the number of tuyeres were increased to 4, sometimes to 6, according to the size of the furnace, and the furnace walls were made considerably thinner than was previously customary.

The blast furnaces erected during the last decenniums are 16 to 18 meters high, the latter being the maximum for a charcoal furnace, as the attempts to increase the height still more have not given satisfactory results. The furnaceshaft is now at the bottom and top made in the shape of a truncated cone, the intermediate part being cylindrical.

When blast furnace gas in 1830/40 began to be used in hot-blast stoves for heating the blast and in roasting kilns, the gas was taken out through one or more ports in the furnace walls, 4 or 5 meters below the top of the furnace. During the years 1860/70, these gas-ports were altered in such a way that from the upper part of the stack, i. e. the charging floor, a sheet-iron cylinder of the depth of 3 meters was suspended, behind which the gas passed and was thence conducted through ports and flues to the kilns where it was to be used. This arrangement for taking out the gas from blast furnaces has proved to be very practical and is now used in all Swedish furnaces not provided with closed charging device. Closed charging devices have only of late come into use. Previously there have certainly been made several attempts to use such feed devices of different types, but these attempts have not proved satisfactory, wherefore such devices have been abandoned. The circumstances contributing to this are: that the difference in the specific gravity between charcoal and the heavy and compact hard ores makes a more accurate charging of charcoal and ore necessary than can be accomplished by the kind of charging devices used at coke-blast furnaces abroad and as the charcoal often contains a large amount of water, in order to get rid of this, relatively large gas ports and gas flues are required. If the charcoal contains much water a closed charging device is not desirable, no matter of what type it may be. Furthermore, it is to be taken into consideration that blowing engines and crushers at most of the Swedish works are run by waterpower, that not all the gas produced is required for the blast furnace, and, finally, that

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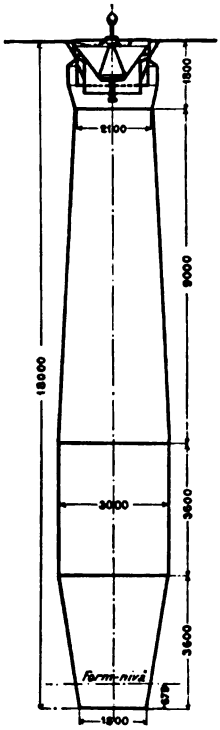
at least 4/5 of the gas can be taken out at the top of the furnace behind the cylinder without the use of a closed charging device. This cylinder arrangement without closed charging device has the advantage of giving a drier and consequently more effective gas. The figure on page 719 shows a Swedish modern blast furnace open top stack, with cylinder arrangement.

As stated before, closed charging devices are, however, used at some blast furnaces, but then only at such works where the gas is used for other purposes, such as Open hearth furnaces, heating of ladles, converters, pit furnaces, etc., and also where there are arrangements for drying charcoal.



The charcoal is always charged by certain measures, called »kolsättning», which however differs from 14 to 16 hectoliters according to the size of the blast furnace. On each charcoal-charge the ore on the other hand is charged by weight, altered as required. At the open top stack the ore is carefully distributed on the charcoal in such a way that a certain weight is charged in a ring close to the wall, called »mursättning», while the rest of the ore is evenly distributed on the charcoal. With a closed charging device it is scarcely possible to distribute the ore as well as in an open top stack, but the devices here in use are in that respect superior to those abroad.

Two different types of charging devices are in use, one by Mr. Charleville, the other by Dr. H. Tholander.

Charleville's charging device consists of a hopper in which a bell is attached. The angular space between this bell and the hopper can be closed or opened by lowering or raising a ring of a triangular cross-section. When the apparatus is closed, two ring-shaped compartments are formed, the one between the ring and the bell, the other between the ring and the hopper. When the ring is lowered, the ore which is in the inner compartment falls towards the center of the stack, but the ore in the outer compartment towards the wall of the stack. The apparatus is in design very similar to the one constructed by the Englishman Coingts, which has been in use at several foreign blast furnaces.

Tholander's charging device consists of the usual outer ring or hopper and inside this a small sheet-iron hopper, which rests on the former by means of a vertical flange. The smaller hopper is kept closed by a bell, which by means of short chains is connected with the former in such a way that after the bell has been raised a certain distance, the smaller hopper has to follow. If the charcoal and part of the ore be charged in the inner hopper and the rest of the ore between this and the outer hopper, the bell then being raised, the first part of the charge falls towards the center, and with the further raising of the bell the hopper, as before stated, is also raised and the balance of ore falls towards the wall. In order better to distribute the ore in the position desired a vertical cylinder is suspended from the funnel.

Charleville's closed charging device was introduced in 1887 and Tholander's in 1891, both being used to about the same extent. The annexed figure shows a Swedish blast furnace stack with Tholander's closed charging device.

Hot blast came into use as early as 1830/40, and already in the year 1835 thirty five Swedish blast furnaces were provided with stoves. These stoves were all rather small and of the Wasseralfingen system. The heating surface was about 0·5 square meter per cubic meter air required by the blast furnace per minute. The blast could be heated only to 100°—150° C. During 30 years scarcely any change was made in these stoves for the reason that the blast

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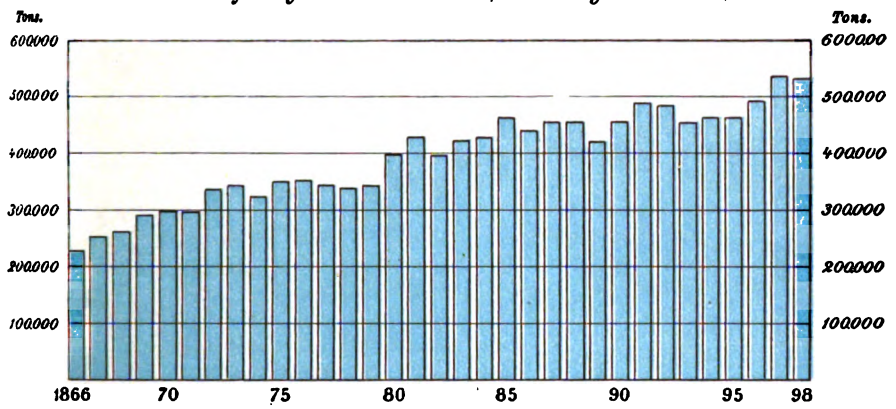
Production of Pig iron in Sweden, in the years 1866/98.[1]



furnaces were run on pig iron intended for use in the charcoal forges, and experience had taught that, with the acid slag produced (about bisilicate), the silicon in the iron became too high in case the temperature of the blast went above 200°. As soon as Bessemer pig iron, however, was produced, more powerful stoves were built, partly by increasing the heating-surface, partly by exchanging the older type for stoves with pipes placed vertically, according to Gjers' system. During the last few decades, the heating surface of these stoves has been increased to 4—5 square meters for each cubic meter of air required per minute by the blast furnace, the result being a temperature of the blast of 450°—500° C. Regenerative-stoves are in use only at two works, viz., those of Björneborg and Domnarfvet; these stoves are of the Cowper system.

These stoves were built seventeen years ago, but since that time they have not been erected at any more blast furnaces, the reason for this probably being that a temperature of 450°—500° may be had in the Gjers stoves, and that by increasing the temperature in the charcoal blast furnaces certainly a larger output may be had, but on the other hand very little is gained for the saving of charcoal, unless a pig iron of very high silicon or manganese is to be produced, which, however, is seldom required here.

Appliances for drying the charcoal came in use during the years 1870/80. Only few of the iron works have such arrangements for drying charcoal, but even where there are such, it is only done when the charcoal is particularly wet. Especially at Bessemer works, the drying of the charcoal is of great advantage, because a more uniform pig iron is thereby obtained. The small blast furnaces in use during the first part of the last century, had a capacity of only 20 to 40 tons production per week, but as the blast furnaces were made larger their capacity naturally increased and now amounts to 100—200 tons, depending on the size of the furnace and the rate at which it is driven. The driving of the furnace varies from 1 to 2·5 fillings per day, according to the reducibility of the ore.

The Swedish blast furnace slags vary in basicity from 1·5 to 2·5 (alumina being counted as a base). Only exceptionally as in the making of Spiegel-eisen, the slag is more basic, being singulo silicate. The slags generally contain some alumina but often considerable quantities of magnesia and protoxide of manganese.

[1] In the years 1899/1902 the production has been resp. 498,000, 527,000, 528,000, and 538,000 tons (metric tons à 2,204 *lbs.*).

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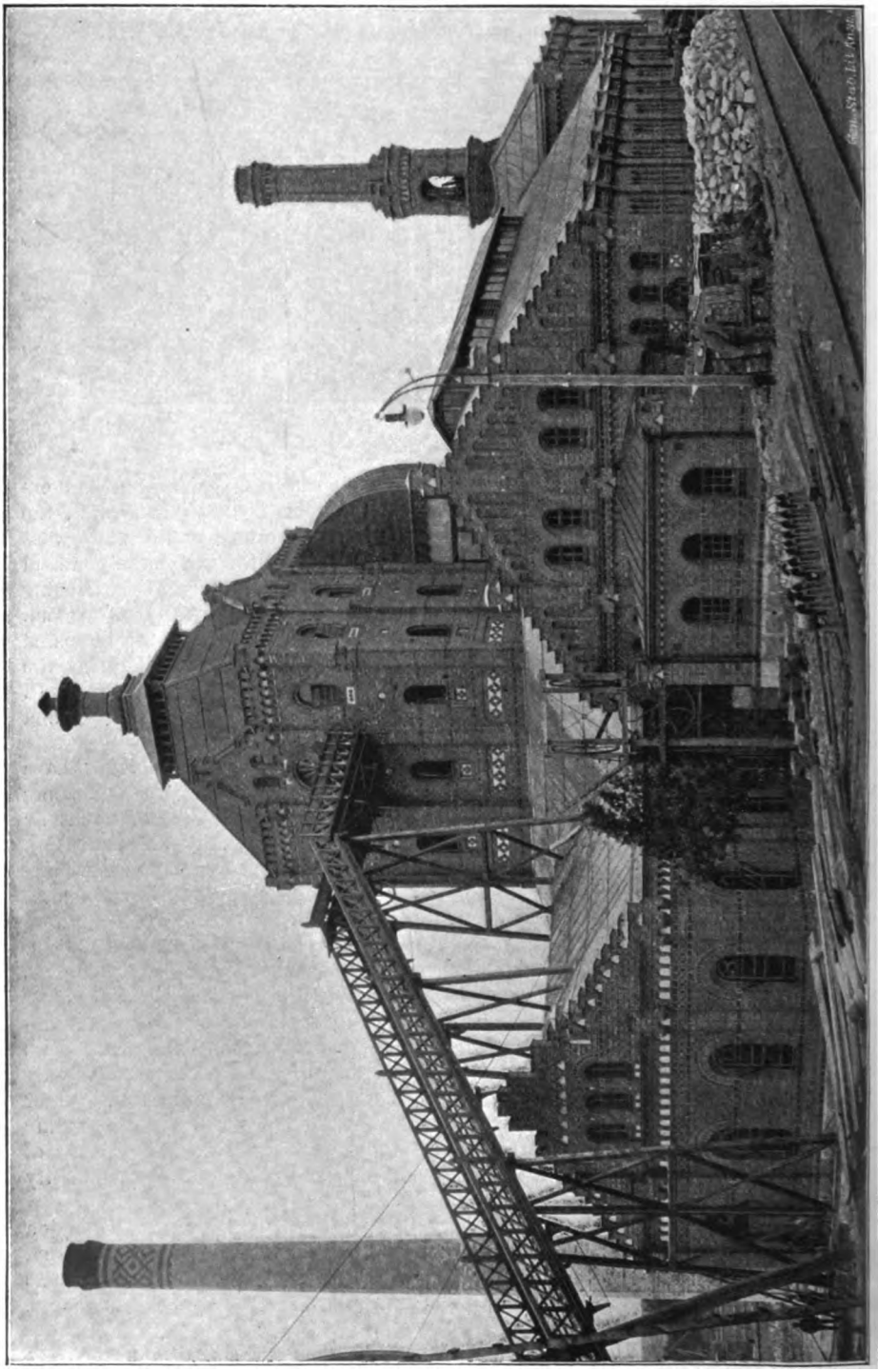

Domnarfvets Blast Furnace seen West.

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The fuel being free from sulphur, it is more economical to get rid of the sulphur by roasting the ores carefully than by means of basic slag in the blast furnace, which always requires a high temperature to melt, and this the more so as the roasting has the advantage that the compact and refractory magnetites, which, as a rule, are the ores chiefly used, thereby are rendered more porous and consequently easier to reduce, thus melting with smaller consumption of fuel. The slags have about the same basicity as the minerals belonging to the pyroxen-group, thus also crystallizing in the same forms as these; well developed angite crystals frequently occur in the slags.

In slags with a high percentage of magnesia olivenite crystals are found, and in those containing much lime, wolastonite crystals. The slag is only used for malling slag-bricks, which are made simply by letting the slag run from the blast furnace direct into moulds of pig iron.

The pig iron produced varies in quality according to the use for which it is intended: for refining in hearth, Bessemer, or Open hearth process. The largest part of foundry iron is imported; only a small part of what the country requires is manufactured here. On account of the perfect roasting of the ores, the Swedish pig iron is exceptionally free from sulphur, seldom reaching 0·03 %, but frequently being almost entirely free from sulphur.

Moreover, the percentage of phosphorus is generally low, but as the country has a good supply of ores high as well as low in phosphorus, it is possible to obtain from them pig iron of very varying phosphorus percentages. A great deal of the ores in Central Sweden has a percentage of only one to two thousand parts of phosphorus, as for inst. certain Dannemora ores, from which pig iron with a phosphorus percentage of only 0·012 to 0·020 may be produced. It is not possible to get lower, inasmuch as the charcoal contains some little phosphoric acid, which alone gives the iron an amount of phosphorus of 0·010 to 0·020 %, according to the quality of the charcoal and the quantity in which it is used. Pig iron intended for steel making, as a rule, contains no more than 0·02 to 0·025 % of phosphorus.

In 1865, the making of manganese iron or so-called *Spiegel-eisen* was begun and is still carried on at the furnace of Schisshyttan. As fuel for this purpose is used a mixture of charcoal and coke, and an iron ore consisting of magnetite and knebelite. The amount of manganese in Spiegel-eisen varies from 12 to 18 %.

Several manganese ores in Central Sweden contain 1 to 5 % of manganese and a very low percentage of phosphorus, making a most excellent pig iron for the Bessemer and Open hearth processes. The ores in Northern Sweden (Lappland), on the contrary, do not contain any manganese, but occasionally indeed some titanium, though generally in but small quantities and rarely to such an amount that the consumption of charcoal is thereby increased.

The consumption of charcoal in the Swedish blast furnaces varies considerably according to the quality of the charcoal and the ore, as also

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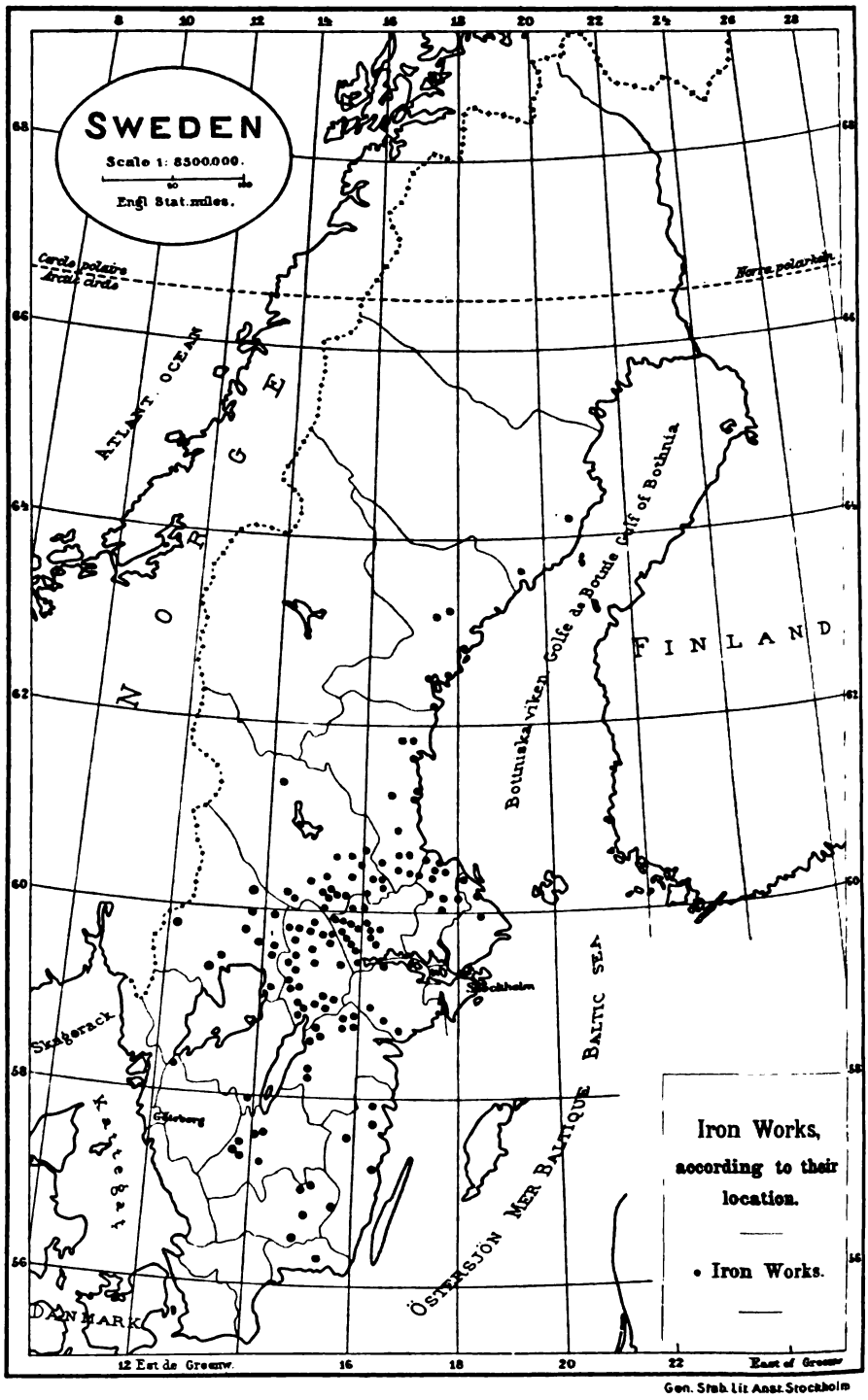

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according to the kind of iron to be produced. Pig iron requires from 50 to 80 hectoliters per ton.

Wrought iron.

The production of wrought iron in Sweden during the last few decades is given in Table 105. It may here be noted that the line of demarcation between bar iron and steel can not be drawn with any certainty, because all Bessemer metal, of high as well as of low carbon, is often designated as steel. As regards the iron which in Table 105 is counted as wrought iron, see notes to Table 101, p. 707.

The number of *wrought iron works*, as shown by Table 105, has of later times decreased to about one fourth of what it was some thirty to fourty years ago, but still the total production has grown to more than double the size, and the average output per works has thus increased more than eight times.

Bar iron and bar steel (in the restricted sense) were produced during 1901 in seventeen of our Läns. Foremost stood the Läns of Vestmanland, with 31,010 tons, and Kopparberg, with 26,113; next in order were Gefleborg with 22,734, Östergötland with 17,361, Örebro with 16,744, Uppsala with 15,800, and Vermland with 10,391 tons; the remaining 12,030 tons were divided on ten different Läns. Total 152,183 tons.

Bar iron was formerly one of the most important **exports** of Sweden, but its absolute as well as relative importance has of late been considerably decreasing. A general view of the imports, exports, and consumption of wrought iron in Sweden is to be had by Table 106, p. 726. In 1900, there were exported 21,897 tons of blooms and rough bars, 165,583 tons of rolled or forged bars, 5,073 tons of bar ends, and 5,143 tons of wirerods, the value of all which amounted to a total of 37·31 million kronor, thus forming 75 % of the total exports of Sweden in unwrought iron and steel for this same year.

TAB. 105. *Wrought iron production of Sweden.*[1]) Metric tons à 2,204 *lbs.*

Average for the years	No. of works.	Production. Tons.	Per works. Tons.	Years.	No. of works.	Production. Tons.	Per works. Tons.
1861/65	425	136,828	322	1895	125	294,135	2,353
1866/70	392	176,544	450	1896	119	321,615	2,703
1871/75	223	178,661	553	1897	107	309,715	2,895
1876/80	296	213,163	720	1898	107	306,348	2,863
1881/85	252	262,194	1,040	1899	104	335,706	3,228
1886/90	186	260,434	1,400	1900	103	329,965	3,203
1891/95	130	276,370	2,126				
1896/00	108	320,670	2,969				

[1]) Bar iron and bar steel, etc.; cf. note 5, p. 707.

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During the quinquennial periods of 1861/1900, the exports of *blooms and rough bars* have been, in yearly averages, respectively 2,503, 7,042, 11,146, 11,313, 7,953, 12,877, 11,578, and 21,270 metric tons; in 1900, the amount was, as is stated above, 21,897 tons. Hence, a rather great increase is to be noted concerning this article.

In like manner as above, where treating of pig iron, an historical account may here be given of the **method in the production** of bar iron, the comparatively detailed treatment devoted to which may in this case, as also in the former, find its explanation from the very prominent position which the iron production has always held in the history of Swedish industry.

Refining in hearths. The oldest well known method of making wrought iron from pig iron by means of refining in hearths was the so-called »German forging», which was introduced in the country at the beginning of the seventeenth century.

This refining was done in an open hearth of heavy cast iron slabs, in which pig iron low in silicon was melted with charcoal, and after being cooled off with water poured into the hearth, was broken loose from the bottom of the hearth by means of iron bars, and was then remelted, this process sometimes being repeated several times. By such oxidizing meltings, the charcoal and silicon in the pig iron were removed, and a lump of soft and slaggy iron was obtained. This was taken out of the hearth, put under a heavy hammer run by water, and cut up into blooms. In order to get a more compact and less slaggy iron these blooms were reheated, which was done in the same hearths, while fresh pig iron was melting, and were afterwards forged by hammers into bars.

For one ton of bar iron over 200 hectoliters of charcoal were consumed, and only two or three tons could be produced per week in a German hearth. The waste amounted to 18 %.

In several other countries, much the same method of refining was used, but was gradually subjected to improvements.

TABLE 106. *Imports, exports, and consumption of wrought iron in Sweden.*[1])
Metric tons à 2,204 *lbs.*

Average for the years	Average population.	Production. Tons.	Imports. Tons.	Exports. Tons.	Surplus of exports. Tons.	Consumption. Tons.	Consumption. Kilog. per inh.
1861/65	3,993,000	136,828	1,318	94,653	93,335	43,493	10·9
1866/70	4,166,000	176,544	1,699	143,980	142,281	34,263	8·2
1871/75	4,274,000	178,661	4,908	139,228	134,320	44,341	10·4
1876/80	4,500,000	213,163	5,424	155,618	150,194	62,969	14·0
1881/85	4,605,000	262,194	9.145	202,048	192,903	69,291	15·0
1886/90	4,742,000	260,434	9,339	194,651	185,312	75,122	15·8
1891/95	4,832,000	276,370	8,125	175,847	167,722	108,648	22·5
1896/00	5,032,000	320,670	20,712	177,530	156,818	163,852	32·6
In 1900	5,117,000	329,965	21,716	175,927	154,211	175,754	34·3

[1]) Bar iron and bar steel, etc.; cf. note 5, p. 707.

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The heating of the blooms in the same hearth where the refining was done impeded the work and increased the consumption of charcoal, for which reason in France separate hearths were begun to be used for the heating of the blooms, which hearths were called »räckhärdar». The German forging thus changed, called Walloon forging, was introduced in 1740 in the Dannemora mining-district, and is still retained there.

Swedish Walloon forging. Like the German hearth the walloon hearth is open, although much smaller, and consists of cart iron slabs, of which the one forming the bottom is of a considerable thickness, and is not cooled with water. Only cold blast is used, and this enters the hearth through a wide copper tuyere which is inclined about 15° towards the hearth bottom.

For this forging, a pig iron low in silicon and usually blown with cold blast is used, which is cast in sand in pieces about six meters long, the cross-section of which has a semi-circular form with a base of 170 millimeters and a height of 120 millimeters. These pig iron pieces are called »gösar». Two such »gösar» are placed behind the hearth, and are pushed forward through an opening in the wall so far into the hearth that their ends will lie across and above the tuyere, after which they are covered with charcoal. When the blast is put on, the pig iron begins to melt from the ends of the »gösar» and to fall drop by drop into the hearth, where it collects on the bottom in a solid lump of iron, to be from time to time broken up with an iron bar and then remelted, until the carbon has been oxidized and a ball of softer iron is obtained.

These balls, being small, weighing only about 40 kilograms, are forged under bloom hammers and cut up in several pieces, which are heated in a separate hearth of nearly the same kind as the melting hearth, called »räckhärd».

By this method, the oxidation is more complete than in other refining methods, and not only is the silicon oxidized, but even phosphorus and sulphur are removed to a remarkable extent. As, however, pig iron is melting from the »gösar» during almost the whole time the refining work in the hearth is continued, it follows that the iron is rendered somewhat uneven in its carbon, but since this Walloon iron is exclusively used in making blister steel for crucible steel, this is of no disadvantage.

In welding the blooms in the »räckhärd», the hardest and most carbonous parts melt, which iron collects on the bottom of this hearth, from which it is broken up and refined; in this manner special meltings are obtained from the »räckhärd», called loop iron. About one fifth of the Walloon iron is thus obtained as loop iron, which in quality is almost identical with the iron produced direct in the Walloon hearth.

The *Dannemora pig iron*, in itself very low in phosphorus, gives by this refining process an extremely pure bar iron free from phosphorus frequently containing only 0·008 % of phosphorus, and in the form of blister steel it constitutes the raw material for the world-renowned Dannemora steel.

The consumption of fuel is very high, namely 214 hectoliters of charcoal per ton of Walloon bar iron, the waste is 25 %, and the output per week only 1 to 1½ ton per hearth, causing the iron produced to be very expensive.

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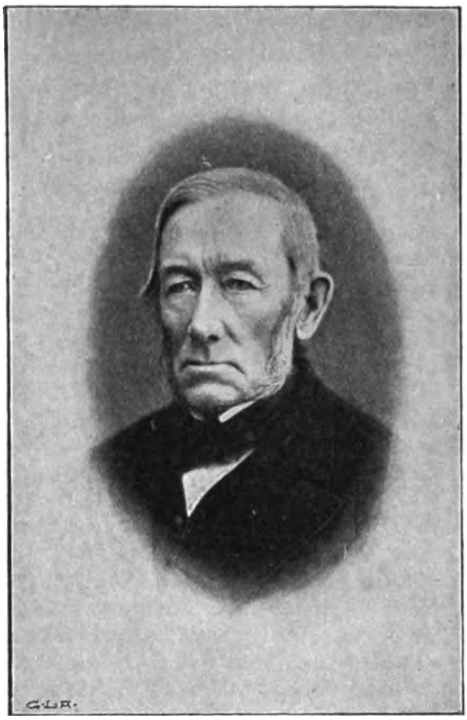
Walloon forging in this form is called *whole-walloon*, but sometimes the pig iron is used in smaller pieces called »galtar» (»boars») in melting- and »räck»- hearths of the same form as Lancashire hearths. The forging is then called *half-walloon*. The consumption of coal is here much less, and the weekly output greater.



G. Ekman.

Lancashire forging. In the decennium 1821/30, a very essential improvement was made in the construction of forging hearths in England. Instead of the open hearth formerly used, the melting chamber itself was surrounded by cast iron slabs with an arch of brick as a roof, so that the hearth was closed and provided with only one working port, the bottom of the hearth was kept cool by means of a box containing water placed under it, and finally there was placed immediately behind the hearth a heating chamber for the pig iron, which was preheated by the escaping gases issuing from the hearth before put into the hearth to be melted.

By means of these arrangements an enormous amount of charcoal and time were saved above what was required in the German or Walloon hearths. Mr *G. Ekman*, very skilled in the Swedish process of iron making, and warmly interested in its development, made several journeys to England to study the method of forging in these new hearths, imported workmen from there, and had trials made with these hearths, first at the Söderfors works in 1831, and afterwards on a larger scale at the Liljendal works in 1836, and from that time this forging, which is called *Lancashire forging*, may be considered introduced into this country.

The hearth has sometimes one, but more usually two tuyeres, which are then placed on opposite sides of the hearth. These tuyeres incline about 12° against the bottom of the hearth and are kept cool with water. The blast pressure is 40 to 60 millimeters mercury. Nowadays only hot blast is used, which is obtained from a little pipe-stove heated by the gases escaping from the hearth. The figure on page 729 shows a Swedish Lancashire hearth with two tuyeres.

The refining is done in the following manner: — For each charge are used 100 to 120 kilograms of pig iron cast in small flat pieces (called »galtar»), which have previously been heated in the heating chamber

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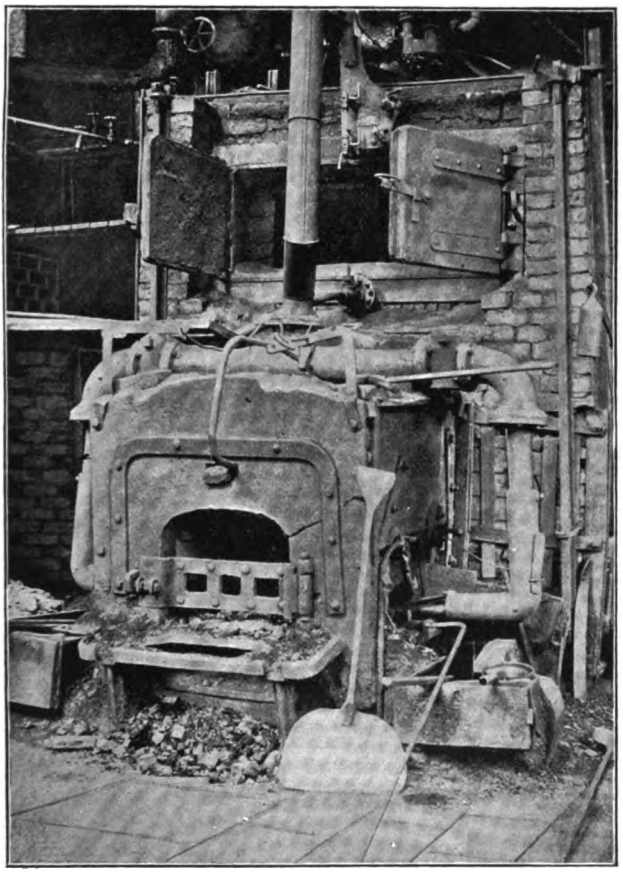
After a little slag has been put into the hearth, it is filled with charcoal a little above the height of the tuyeres, then the red hot pig iron is raked out of the heating chamber, placed in the charcoal, after which the blast is applied and the melting of the pig iron is begun. In order to replenish the charcoal consumed, fresh charcoal is thrown into the hearth from time to time, while from an adjacent little reservoir small quantities of water are poured over the charcoal with a dipper, partly to make the heat from the hearth less annoying to the workmen, and partly to prevent the carbonic oxide from burning before entering the preheating chamber.



Lancashire hearth.

The charcoal ought also to be washed before being used, which is done by first dumping it into a large watertank, from which it is then brought direct to the hearth. The object of the washing is to clean the charcoal from sand and mud, which, if allowed to remain, would increase the percentage of silicon in the slag and cause a larger waste. The charcoal being wet is also advantageous, because then less charcoal is consumed by air, which enters the hearth from the working port.

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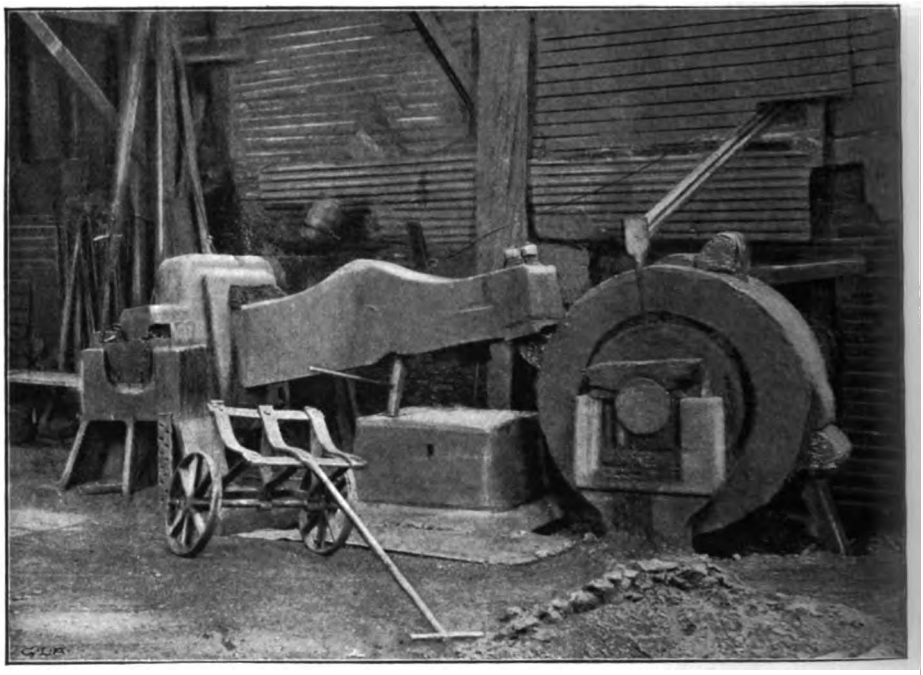

Bloom-Hammer.

In the degree that the charcoal is consumed by the blast, the pig iron naturally sinks towards the bottom of the hearth, and in order to prevent this, a bar is inserted under the pig iron pieces, by which they are again lifted above the tuyeres. The pig iron melts gradually and is collected on the top of the slag, which is on the bottom of the hearth, where it solidifies on account of the cooling off of the bottom. As soon as all the iron is melted and collected on the bottom, the work of breaking loose is begun, which consists in loosening the iron from the bottom of the hearth with the bar and lifting it up towards the tuyere in order to melt it again, and thus the work continues uninterruptedly until the silicon, manganese, and finally the carbon are oxidized and the pig iron converted into »färskor» (pieces of refined iron) of soft iron, which are at last melted and welded together into a large ball, which is taken out of the hearth and placed under the bloom hammer (fig. above), under which it is compressed and cut into several blooms. The heating of these blooms to be forged into bar-iron is sometimes done in the same kind of hearths (half Walloon forging), but usually in reverberatory furnaces, which are then called heating furnaces.

The above described Lancashire hearth is the most common one, but somewhat deviating constructions also exist. Thus, there are similar hearths with only one tuyere, and others with three, the third being placed at the back of the hearth. There are also quite often somewhat larger hearths in use with two tuyeres and two working ports placed opposite each other; these are called double Lancashire hearths.

Pig iron suitable for Lancashire forging ought to be white to half-white and have a low percentage of silicon, 0·3 to 0·5 %, wherefore it is usually produced with a hot blast of only 200° to 300° C. The percentage of manganese ought also to be low, preferably only a few tenths of one per cent, because the refining process is retarded by manganese.

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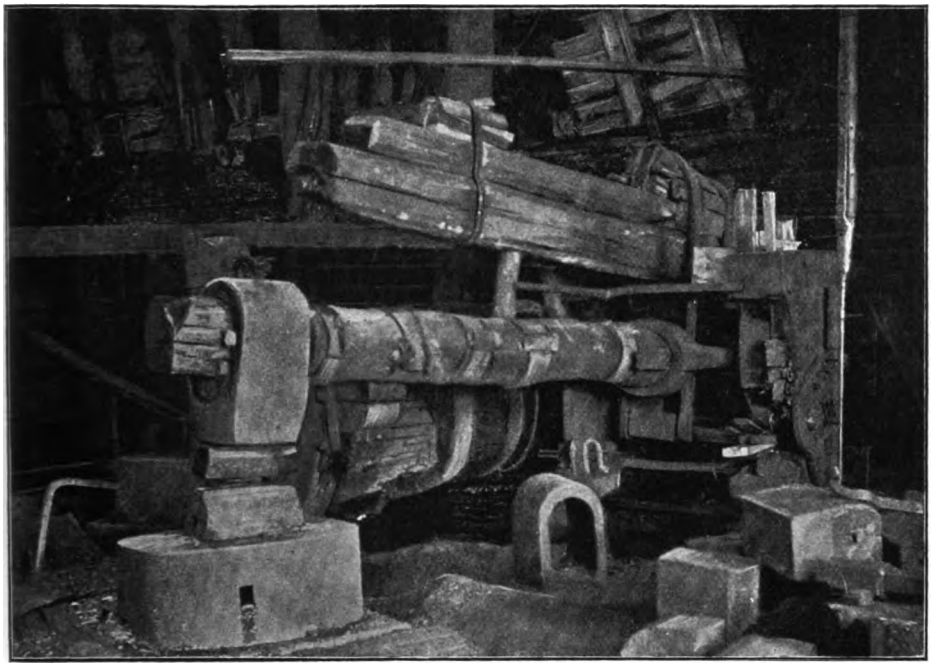

Flattening Hammer.

At the same time as the Lancashire forging was introduced, the blooms were heated in reverberatory furnaces instead of in hearths, which were called heating furnaces. Mr. G. Ekman also constructed such a heating furnace, which, with some alterations, is still used, and is called Ekman's Heating furnace. As fuel for this heating furnace, fossil coal, wood, or peat is used; usually, however, a mixture of these fuels.

One ton of blooms requires 6 cubic meters of charcoal, and one ton of bar iron, if the heating be done in a »räckhärd», 14 cubic meters; in case the blooms are heated in a heating furnace, a cheaper fuel can be used, as implied above. In a Lancashire hearth about 10 tons of blooms can be produced per week.

Franche-Comté forging. After these improved hearths (Lancashire hearths) had come into use in England for Walloon forging, the same kind of hearths began to be used in France for the German forging. This altered German forging was then introduced in this country, in 1853, by the name of Franche-Comté forging. Thus, in a Franche-Comté hearth the heating of the blooms is done in the hearth, while the pig iron is melting; the balance of the work is done in the same way as Lancashire forging. The pig iron ought, however, to have a somewhat higher percentage of silicon than the Lancashire pig iron. The heating in the hearth is slow, so that the production is considerably less.

In a Franche-Comté hearth only 3·5 tons of bar iron is produced per week with a consumption of 13 cubic meters of charcoal and a waste in heating of about 18 %.

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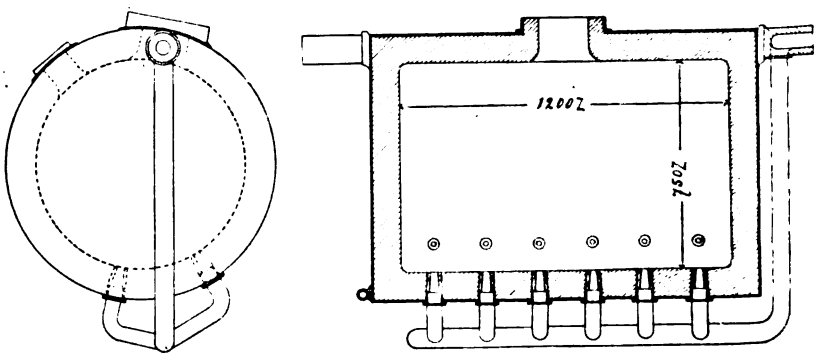
This kind of forging was very common in Sweden in the decennium 1860/70. The reason was that Swedish iron production was at that time distributed among a large number of smaller works, many of which even had a smaller output of blooms than was required for one heating furnace (to keep a heating urnace continually working, blooms are required from at least three or four Lancashire hearths), and for these works German or Franche-Comté forging was most suitable.

In the degree that these small works were abandoned and iron production was concentrated on a few larger works, both German and Franche-Comté forging ceased, and Lancashire-forging was commonly adopted, and is now almost exclusively used, with the exception only of the Dannemora iron district, where Walloon forging is still retained at several works.

Puddling. This method of refining, very common in other countries, has never been much used in this country. It is true that trials were made with this process in 1820, but it came into more extensive use only in the decennium 1841/50; towards the end of the decennium 1871/80, about 20 puddling furnaces were used here, distributed among several works. Since then, however, the making of puddle iron has constantly decreased, and at the present time only few such furnaces are in use. The puddling furnaces used here are of the ordinary type and are fired with fossil coal or wood.

Ingot iron (Steel).

After Sir **Henry Bessemer** in 1855 and 1856 with but little success had tried to perfect his method of making steel and iron from pig iron by letting air pass through the liquid iron, which method of refining was called the Bessemer process after the inventor, experiments with this method were made in Sweden in 1857 and 1858, and with more successful results, although here also great difficulties had to be overcome. Thus, *the Bessemer process has chiefly been worked out here in Sweden*, and how this came about will now briefly be told. —



The first Bessemer Furnace at Dormsjö, 1857.

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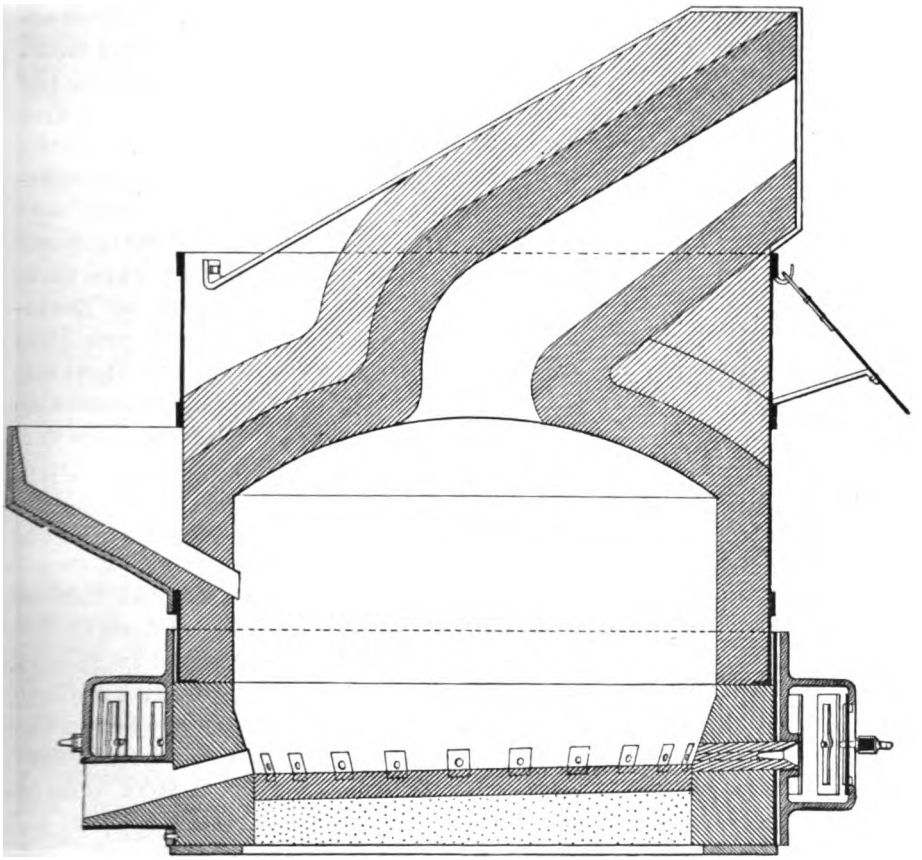
Pontus Kleman, a Swedish merchant, and owner of the Garpenberg and Dormsjö works, who was at that time living in England, decided to have experiments made at the Dormsjö blast furnace with this new refining process, and for this purpose a little Bessemer furnace was erected there, for which Bessemer had furnished the drawings.



Bessemer Furnace at Edsken, 1858.

These first experiments at Dormsjö were made in the beginning of 1857, under the guidance of a Swedish engineer, *John Leffler*. The Bessemer furnace was of a cylindrical form, with flat ends and hung on two trunnions, placed at the upper edge of the ends. One of these trunnions was hollow and formed a part of the blast pipe, which extended under the cylinder, where the blast was admitted into the furnace through twelve tuyeres, as shown by the figure on the preceding page. This furnace could be tipped over by means of a winch and a chain, which was attached to the edge of the end opposite to the trunnions; thus, the furnace was a kind of tipping furnace. It had further-

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more two openings, one at the same height as the trunnions, the other somewhat lower down on the side for the tapping of the steel, the latter being closed up with refractory material during the blowing. The iron, which was taken direct from the blast furnace, was charged through the upper opening.

Very poor results were obtained with this furnace; the iron became too cold, and the largest portion solidified in the furnace. But nevertheless Bessemer's patent for Sweden was bought by Consul **G. F. Göransson** in 1857; he was then manager and a large shareholder in the firm of Daniel Elfstrand and C:o, wholesale merchants, which firm owned the Högbo works and the Edsken blast furnace, to which the experiments with the Bessemer process were removed from Dormsjö as early as in November the same year.

G. F. Göransson.

At Edsken a few experiments were also made with the same furnace as that used at Dormsjö, but afterwards a new Bessemer furnace was built there, the drawings for which were also furnished by Bessemer. This furnace was a stationary furnace with two rows of tuyeres, placed around the furnace quite near the bottom.

These experiments at Edsken were also, to begin with, conducted by Mr. Leffler, assisted by Messrs. *Carl Lundvik* and *C. P. Lindberg*. The results were, however, also in this case rather unsatisfactory, for sometimes good steel was obtained, but frequently it was full of blowholes and could only partially be tapped from the furnace; it was evidently altogether too cold.

Finally, Consul Göransson had the upper row of tuyeres removed and made those in the lower row larger, and in the furnace thus altered (fig. p. 733), the first blowing was made on July 18, 1858, with quite a different result from that formerly obtained; the steel flowed easily, was of a closer grain, could easily be tapped, and in test forging showed excellent properties.

Here the experimental stage was passed, and it was proved that the Bessemer process was both an economical and an advantageous process of refining. The Bessemer process was afterwards continued at

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Edsken until March 1866, when these works were abandoned. But meantime a new company was formed, the Högbo Joint Stock Company, Göransson becoming its manager, which company, in 1862/63, built new iron works, Sandviken, with Bessemer works. Here the first tipping furnaces were erected, the so-called Bessemer converters (according to drawings by Bessemer), and the blows were conducted here by Messrs. *C. Lundvik* and *O. Kollberg*, the latter having by analyses and scientifical researches found out both the chemical process of this refining and the conditions for carrying it out.

After the Bessemer process had proved a success at Edsken, the same refining process began to be introduced at several other Swedish iron works, which process seemed to be particularly well adapted for our country with its pure ores and waterfalls as a power. At all these works, stationary Bessemer furnaces similar to those at Edsken were built.

It took a long time, however, before the advantages expected from the new process were realized.

The Swedish iron manufacture was at this time, as already mentioned, distributed among a large number of smaller works, and there were no rolling mills to work down the steel ingots, which therefore had to be exported, and this became less and less profitable, the more Bessemer metal was produced abroad. This, together with the circumstance that the old stationary Bessemer furnaces proved less convenient than converters, caused the further progress of the Bessemer process to be very slow, and even a large number of Bessemer works already built were shut down. The Sandviken Bessemer works made steady progress, however, and its manager, Mr. Göransson, built blooming, merchant, and coldrolling mills, and also steam hammers, for the further working of Bessemer metal to shafts, etc., and this very day Sandviken is still the leading one of our Bessemer and Manufacturing works. Göransson has not only worked out and introduced the Bessemer process into this country, but also commenced turning Bessemer steel into products of different kinds on a very large scale.

Gradually other iron works followed the example of Sandviken, and as the most prominent Bessemer works at the present time may be mentioned Sandviken, Domnarfvet, Hagfors, Iggesund, Björneborg, Vestanfors, etc., all of which produce an excellent Bessemer steel, which they manufacture into finished products.

The Bessemer process in Sweden at the present time. The pig iron used for the Bessemer process is generally a charcoal pig iron very free from sulphur and phosphorus, which is taken direct from the blast furnaces into the converter; remelting in cupolas is not practised. The percentage of silicon in the pig iron varies from 0·6 % to 1 %, and the manganese from 1·5 % to 2·5 %. A higher percentage of silicon and manganese is only used in exceptional cases.

With a pig iron of this composition the blowing can be stopped when the desired percentage of carbon is obtained and still a steel free from silicon be produced, without blowing down to soft iron and then recarbonizing with coal or pig iron, as customary abroad.

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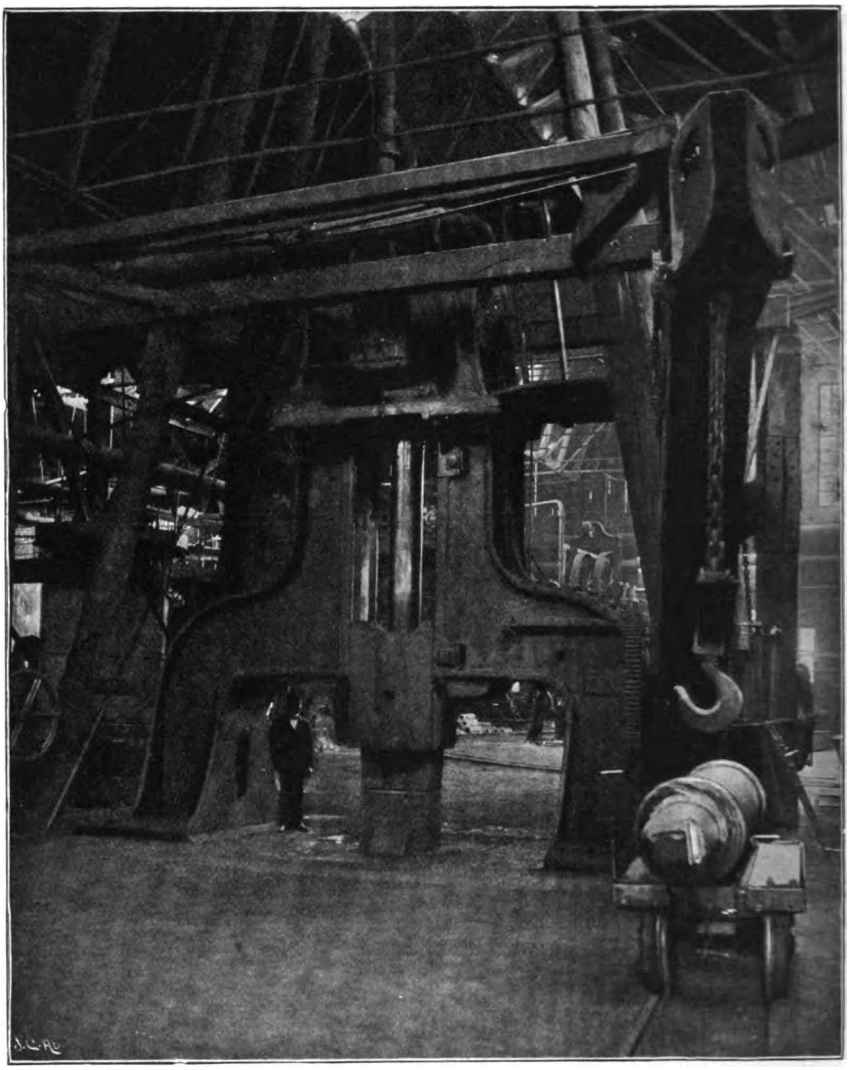

Steam Hammer, Sandviken.

In order to produce such a pig iron containing a high percentage of manganese and a small percentage of silicon, a rather basic blast furnace slag is required, the basicity of which generally varies from 1·5 silica to nearly singulosilicate. But as a basic blast furnace slag is not very fusible, the temperature in a blast furnace must be higher than when, for inst., a Lancashire pig iron is blown, wherefore more charcoal is consumed, and, as a consequence, the Bessemer pig iron costs more to produce. The iron hereby, however, becomes considerably hotter, and this excess of heat afterwards proves of great advantage in the Bessemer furnace; for as it is chiefly the silicon in the iron when oxidizing which produces the heat necessary for the process (also manganese but in a less degree), the process could with such a small amount of silicon in the iron, generally under 1 %,

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hardly be carried out without a considerably higher temperature of the iron than the melting temperature. With a larger percentage of silicon in the iron, and the consequent high temperature, the difficulty to get a good product in the Swedish Bessemer process is also increased (the process being interrupted when the desired percentage of carbon has been reached), for the refining consists in the oxidation of silicon, manganese, and carbon in the iron by means of oxygen, but the affinity to oxygen of these substances varies with the temperature, so that at a temperature of about the melting point of pig iron, these substances are oxidized in the order in which they have been mentioned above, but if the temperature is *extremely* high, their oxidation and removal from the pig iron may even take place in an entirely *opposite* order, and consequently great care must be taken that the process be carried out at the right temperature, unless the blow either will run too cold, so that the iron will have a tendency to solidify in the converter or ladle, or become too hot, in which case the steel is deteriorated by too high a percentage of silicon and manganese. But this is not all; the blowholes which the metal always contains to a higher or lower degree after solidifying and which are caused by gases escaping during the cooling, are also as to quantity and distribution throughout the ingot dependent upon the temperature.

Mr. *C. A. Caspersson* has made numerous observations at the Bessemer works of Vestanfors in regard to this matter, and has tried to determine certain temperatures during the blow, which he has denoted by the figures 0, 1, 2, 3, and 4. With the lowest degree of temperature, which he has denoted with 0, the metal has a large number of blowholes distributed everywhere throughout the ingot; at the next degree of temperature, No. 1, the number of blowholes diminishes, and they are then situated in the form of a belt in the ingot, the outer and inner parts of which on the contrary are free from blowholes. If the temperature be still higher, degree No. 2, the number of blowholes diminishes still more, but the blowholes formed are situated near the surface of the ingot, and furthermore the ingot will have a tendency to get hollow in the middle at the top, which, however, is not caused by the gases but by the shrinkage of the metal during cooling, and which is called »pipe». If the temperature be increased still more (No. 3 and 4), the formation of blowholes ceases, but the »pipe» grows still larger. The blowholes near the surface of the ingot and the »pipe», are most injurious, for their inner walls are oxidized by the air at the heating of the ingot, and afterwards they cannot be welded together but cause cracks, which have an injurious effect on the tensile strength of the steel, but this is not the case with the blowholes in the belt. For this reason temperature No. 1 is the only one to be used. Furthermore, these temperatures thus denoted by figures are not constant but vary with the carbon (iron with increased percentage of carbon becoming more fusible), so that a temperature which for soft iron is denoted, e. g., by 0, and thus is totally unfit, is on the other hand suitable for steel, etc.

The Caspersson method of determining the right temperature at which the steel should be tapped, is frequently spoken of as being too complicated and difficult to apply. This, however, is not the case, for these different degrees of temperature which Caspersson has denoted by figures, depend in the first instance on the percentage of silicon in the pig iron, which is easily determined by its appearance.

The generator of heat is the silicon (and manganese) in the pig iron, but the amount of silicon can well be estimated from the amount of graphite in the pig iron sample cast in the test mould, and the carbon in the product must, to a certain degree, conform to this, if the steel is to be of a first class quality.

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Care is taken, to be sure, not to blow soft iron from perfectly white pig iron and hard steel from perfectly grey pig iron, for in the former case it is known that the product will be too cold, in the latter rendered too impure by silicon and manganese. In the first place, one is dependent upon the running of the blast furnace, which, when its product is intended for a large quantity of steel of the same composition must be extremely even and constantly produce a pig iron with the percentage of silicon and manganese which is best suited for blowing of steel of this composition.

By carefully assorting the charcoal and by drying it if necessary, by keeping the slag at a fixed percentage of silica, and regulating the temperature by means of good hot blast stoves, it is possible to get a uniform pig iron for a long time, but many times disturbances also occur in the running of the blast furnace, the pig iron turning out too white or too grey for the purpose intended, and then it is best to make a steel from this pig iron with another percentage of carbon, for which the pig iron is more suitable.

This circumstance is the greatest disadvantage of the Swedish Bessemer process.

In order as much as possible to avoid impurities in the steel and »pipe» in the ingot, the pig iron must be such that the temperature in the converter does not become unnecessarily high, but then it also happens, as Caspersson has shown, that the gases form belt-blowholes, which is a fortunate circumstance.

During the blowing process itself, there are also certain signs which characterize a low or a high temperature of the iron in the converter, as the length of time from the beginning of the blow until the boiling begins (the term boiling is applied to that stage of the process when the carbon as carbonic oxide with a violent bubbling leaves the liquid mass of iron), the nature of the flame issuing from the Bessemer furnace, the appearance of the slag, etc., etc.

There are also means for increasing or diminishing the temperature of the metal during the course of the process; in the former case ferro-silicon is added, in the latter case cold iron scrap. It is best, however, from the beginning, to have a pig iron which will give the required temperature to the steel.

The Swedish Bessemer process has the great advantage of making an addition of ferro-manganese unnecessary at the close of the blow, to take away the red shortness from the steel on account of oxidized iron, which is due partly to the high percentage of manganese in the pig iron, and partly to the blowing being interrupted while the carbon is still high and the iron consequently cannot contain oxidized iron. Only in case soft iron is to be produced, an addition of ferro-manganese is made.

In order to get ingots entirely free from blowholes, however, there is sometimes added, when the blow is finished, either ferro-silicon-manganese or aluminium, the former in the converter, the latter while the iron is poured into the moulds. The amount of aluminium to be added depends upon the percentage of carbon in the steel; for hard steel only 0·005 % is used, but for soft steel up to 0·02 % and more. A larger addition of aluminium makes the steel less fluid and increases the number of blowholes instead of diminishing them.

The converter. The Bessemer furnaces or converters at present in use are of the same form as those first used at Sandviken in 1863, only the size of the converter and the mechanical appliances for tipping it having been altered. The furnaces made of iron plate lined with silica bricks or with gannister, is suspended on two trunnions, one of which is hollow and connected with the blast-pipe, which is then continued by another pipe to a box under the bottom of the converter, whence the blast enters through a large number of tuyeres to the furnace and passes through the liquid iron.

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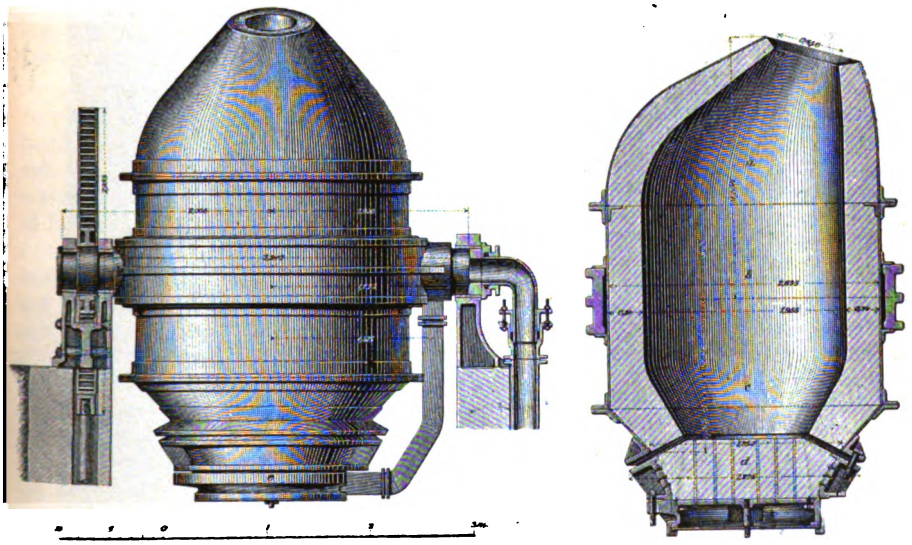
The bottom is either built with specially formed bricks with a certain number of holes in each (strainer-bottom) or else so-called Bessemer-tuyeres are used, which are cylindrical and made of fire clay, having each 10—12 small holes, the tuyeres being fixed into the bottom. Both ways are about equally common. The strainer-bottoms have a large number of tuyere-holes, 150 to 200, each 6 to 8 millimeters in diameter; when Bessemer-tuyeres are used, the number of holes is less, 90 to 120, but the diameter of the holes larger, 12 to 15 millimeters. The total area of these holes varies from 35 to 50 sq. cm. per ton of pig iron and is thus large in comparison to what is used in other countries. This is also necessary, the converter being small, as the charge cannot be larger than one cast from the blast furnace, or 3 to 4 tons, and the pig iron is to have a comparatively low percentage of silicon, both of which circumstances tend to lowering the temperature in the converter and to making the steel too cold, in case the tuyere area be not large, so that the blow can be done in a short time. — The pressure of the blast varies from 500 to 1,000 millimeters mercury.



Bessemer Converter.

The carrying out of the process. From the blast furnace the iron is tapped into a ladle, and a sample is taken out and cast in a small mould. The ladle with the iron is weighed and is then brought to the converter, which is now turned into a horizontal position, after which the iron by means of an iron spout, lined with fire-clay, is poured into the converter.

Meantime the iron sample has cooled and been broken, and from the appearance of its fracture is estimated its percentage of silicon and the blast-pressure which ought to be used at the beginning of the blow.

If the iron sample is completely grey, the highest pressure possible, or 1,000 millimeters mercury or more, is generally used, for, on account of the high percentage of graphite, the tuyeres have a tendency to fill up, and much blast is required for the oxidation of the silicon; but on the other extreme, or in case of entirely white iron, a very low pressure is used instead, for instance, 600 millimeters. Thus, after a blast pressure has been applied corresponding to the nature

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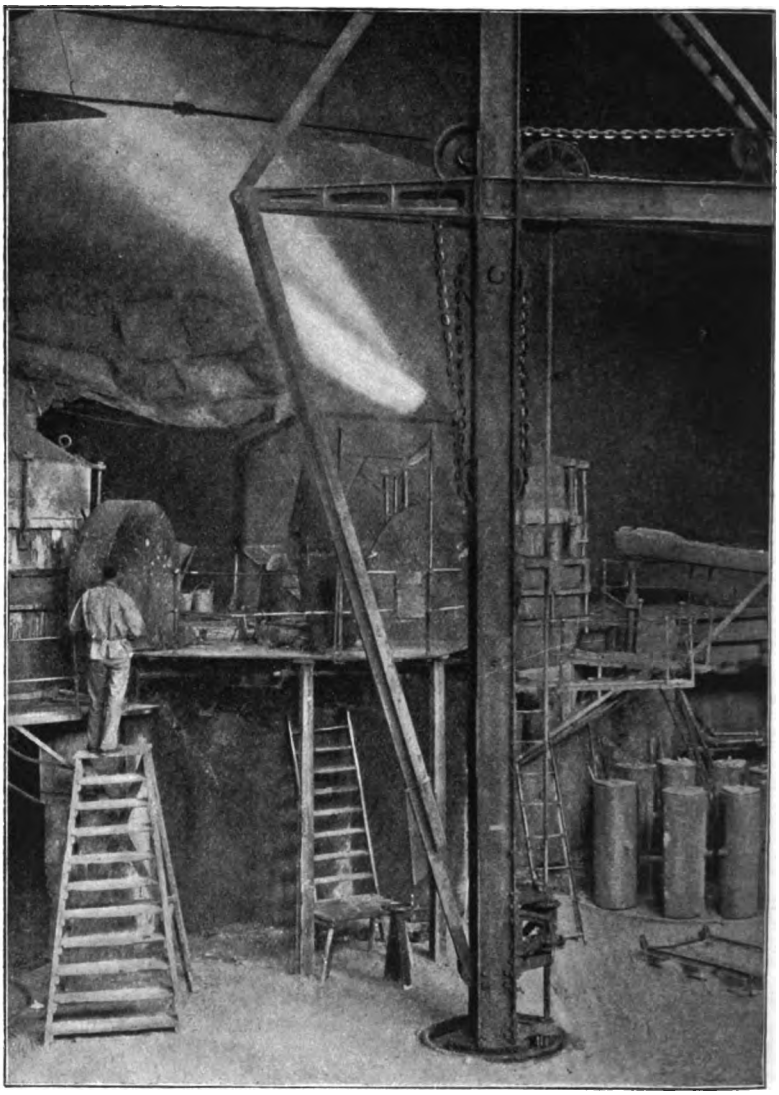
of the iron, the converter is turned up and the blast is caused to pass through the liquid iron, when the refining begins, the progress of which is judged of, partly by the size and appearance of the flame escaping from the mouth of the converter, partly by the sparks generated by the combustion of the small drops of iron thrown out with the gases into the air.



Converter at work.

Only after the greatest part of silicon and manganese have been oxidized and slag has been formed, the oxidizing of the carbon commences, when a great quantity of carbonic oxide is formed, which colors the flame violet, this being a sign that the boiling has begun.

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With an increased percentage of silicon, manganese, and graphite in the pig iron, the starting of the boiling is delayed, which with entirely grey pig iron can be expected in 8 or 10 minutes, but with entirely white pig iron frequently begins after $1^1/_2$ minute's blowing. But even with white-iron, if it has a low temperature so that it is thick, the commencement of the boiling is delayed. With hot pig iron of normal composition the boiling begins after about three minutes.

During the boiling the violent development of carbonic oxide causes a puffing up of the metal, and a big quantity of slag and particles of iron are thrown out from the furnace; in order to lessen this disadvantage the pressure of the blast is lowered by 100 or 200 millimeters, but is usually raised again after the boiling has decreased.

As has already been said, these sparks are caused by the combustion of small particles of iron, but the light caused thereby changes with the percentage of carbon. If the percentage of carbon is high, the sparks will be large, comparatively few in number, and burn with a sharp, white light, but as the carbon decreases the number of sparks increases, they become smaller, and burn with a milder, bluish light.

When, by these signs, it is found that the steel begins to approach the correct percentage of carbon, the converter is turned down and the blast is stopped, after which the steel is subjected to other tests by which its hardness (percentage of carbon) can better be judged. By means of an iron ladle covered with clay, which is inserted at the mouth of the converter, a sample of the steel is taken out and poured into a little mould; the nature of the sparks then thrown off by the steel is now better judged of than during the blowing, and, moreover, the form of the surface of the hardened steel in the mould indicates with considerable certainty its percentage of carbon. If the same be over 1 % it swells somewhat and hardens with a convex surface; with a percentage of 0·90 the surface shows on the contrary slight signs of concavity, which increases with decreasing percentage of carbon, so that for the very soft iron with a carbon percentage of 0·1 % and below that, the metal after cooling hardly fills more than half of the mould and leaves sharp edges along the walls of the mould.

Now if this test shows too high a percentage of carbon, the converter is raised again and the blowing is continued a short time, after which the same test is repeated, and if necessary the blowing is again continued for a few moments, and so on, until the sample contains the desired percentage of carbon.

This is not fully satisfactory, however, so that after the probably correct percentage of carbon has been thus determined, the piece of steel obtained in the test mould is forged out, and so-called forging tests are made on it, partly to verify the percentage of carbon still better, and partly to see if the steel is red short (from oxidized iron).

The method of treating these forging samples varies somewhat, depending upon whether the previous tests have shown a carbon percentage above or below 0·50. If the percentage of carbon be 0·50 or above, it is estimated partly by the disposition which the steel has to get burnt more or less easily and partly by the appearance of the fracture after the tempering of the steel.

When steel is heated to a very high temperature, for instance white heat, it will have a crystalline fracture, throw off sparks when taken out from the forge, and have a tendency to crack and fall to pieces when hammered; the steel has then been heated to too high a temperature and is said to be burnt. But the higher the percentage of carbon is, the easier the steel will get burnt, so that if the carbon percentage is only 0·50 the burnt steel may with some care be forged out without cracking, but with increasing percentage of carbon, its forging becomes all the more difficult, so that if the amount of carbon increases above

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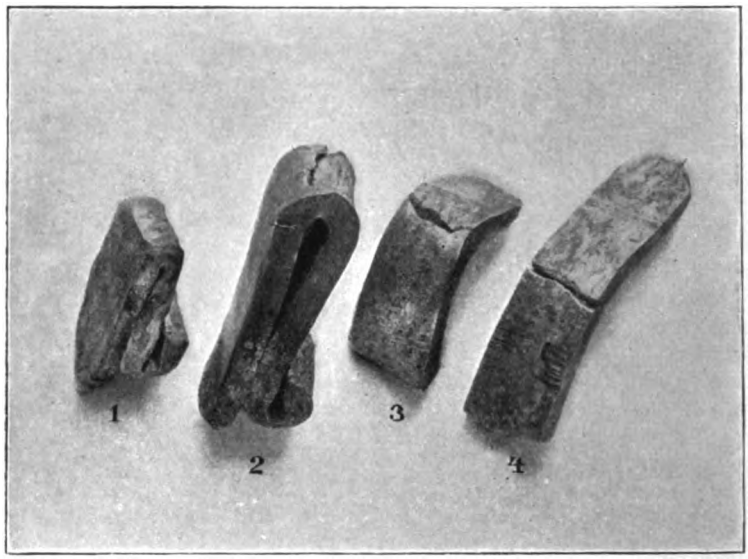
1 %, the steel actually falls to pieces when an attempt is made to work it under the hammer. The higher the percentage of carbon in the steel, the lower is the temperature at which it will become burnt. This test is always combined with a tempering test, the percentage of carbon being estimated by the brittleness of the steel and the appearance of the fracture after the tempering.

For this test the steel is forged into dimensions of 15 × 4 millimeters, after which it is heated to yellow heat and then broken off. Now the amount of carbon, if above 0·50 % is judged of by the brittleness of the steel after tempering, i. e., the more or less heavy strokes of the hammer which are required to break it off, in connection with the appearance of the fracture.



The bending-test.

Already at an amount of carbon of 0·50 %, the steel breaks off without bending if it is laid on the edge of an anvil and given heavy blows with the hammer, the fracture being light coloured and coarse grained, but the higher the percentage of carbon, the easier the steel breaks off and the finer grained and darker the fracture appears. If the carbon be lower than 0·50 %, the steel will bend slightly before breaking, and the lower the percentage of carbon, the more the steel will stand bending, so that the soft iron with a percentage of carbon of 0·15 can be completely doubled up without any cracks occurring.

Percentages of carbon below 0·50 are therefore always estimated according to the degree to which the hardened steel can be bent in a cold state without cracking in the bend, instead of by the appearance of the fracture and the proneness of the steel to get burnt.

The accuracy with which it is possible to judge of the carbon percentage of soft steel and iron is best shown by the above photographic reproduction of bending tests with steels of different percentages of carbon, of which N:o 1 has 0·15 %, N:o 2 0·25 %, N:o 3 0·30 %, and N:o 4 0·35 % of carbon.

In connection with these tests of the hardness of the steel, tests are also made with respect to its red shortness. For carbons above 0·50, this is done by bending the steel forged out at red heat to 15 × 4 millimeters to and fro

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over the edge of the anvil; the more bendings the steel will stand without breaking, the less red short it is. For percentages of carbon below 0·50, however, it is customary at a red heat to punch a hole near the edge of the iron bar, and if cracks appear, the iron is red short.

After it has been ascertained in aforesaid manner that the steel has the desired degree of hardness, it is tapped from the converter into moulds. Only in case the test of red shortness has proved unsatisfactory, ferro-manganese is added in the converter before the tapping. As has already been said, such an addition is generally not necessary for steel, but must nearly always be made for soft iron.

As long as there were small and insufficient stoves at the Bessemer blast furnaces, it was often difficult to make a sufficiently hot iron, wherefore the steel also turned cold in the tapping. This circumstance caused Mr. *Caspersson* (1880) to design a ladle, which, after finished blowing, is secured to the mouth of the converter, and as the converter afterwards is turned down, part of the steel runs into the ladle, and is afterwards in the usual way poured into the moulds.

The largest portion of the steel is by means of this device left in the hot converter during the tapping, and is not subjected to the cooling which therefore takes place when the steel is tapped all at once into a large and comparatively cool ladle. Fig. on page 744 shows a converter with a Caspersson converter-ladle attached. The converter-ladle is, however, attented with certain disadvantages, among others that the moulds must be placed close to the converter and be moveable. At the present time this kind of ladle is less commonly used, and generally only in cases when soft steel or iron is to be made.

During the tapping still other samples of the steel are taken, from which carbon determinations are made by Eggertz' colorimetric test, frequently also for other substances, such as phosphorus, silicon, manganese, and sulphur.

As a rule, the carbon tests agree very accurately with the degrees of hardness determined during the process by means of forging tests, which are also denoted in percentages of carbon. This ought indeed to be the case, the Swedish Bessemer steel being high in carbon and comparatively free from silicon and manganese. Only exceptionally, as when the steel has been too hot and has become too hard by taking up silicon and manganese, these tests do not agree.

In order to protect the moulds against the hot steel, some sawdust or oil is placed in the bottom, and in order to prevent a further generation of gas after the mould is filled, it is covered with a cast iron lid, sand, or the like. As several hours generally elapse between the blows, both the converter and ladles cool off and must therefore be specially heated before the blowing, which is sometimes accomplished by coke or charcoal, but usually with blast furnace gas which is burned in burners especially designed for this purpose.

The Swedish converters are small. The diameter of the bottom is 1 to 1·3 meter, the diameter of the cylindrical part is 1·3—1·7, and the height 2—2·5 meters, all inside measurements. In order to retain the heat in the furnace as much as possible, the mouth is made narrow, 200 or, at the most, 300 millimeters.

At one of the Swedish Bessemer works, namely Avesta, a very small converter is used. In 1878, a small Bessemer furnace of ordinary construction was erected there, intended for charges only weighing 200 kilograms. This furnace has since been exchanged for one somewhat larger, according to Robert's design, and the size of the charge is a little over one ton. This latter Bessemer furnace has only one tuyere, and in tapping the steel, Caspersson's converter-ladle is used.

The real advantage of these small converters is that the process does not require such large and powerful blowing-machines, but, on the other hand, the

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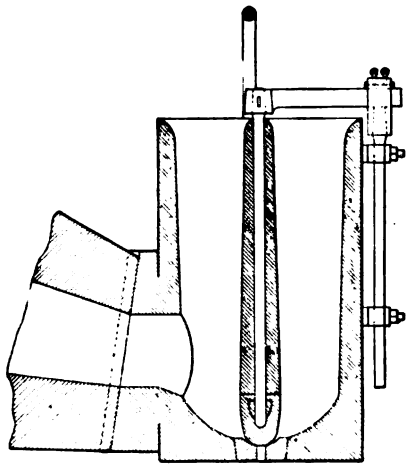
temperature becomes lower through greater radiation of heat, which, however, since the iron is taken direct from the blast furnace, is to a certain extent counteracted by the fact that, by having small charges, it is possible to reduce the distance from the tuyeres to the bottom of the furnace, thus getting the pig iron hotter. The waste is, however, somewhat greater than in ordinary, larger converters.



Caspersson's Converter-ladle.

Basic Bessemer is used at only one of our iron works, Domnarfvet, where acid and basic processes are carried on.

The pig iron for the basic Bessemer process is made from Grängesberg ores very high in phosphorus, and is also taken direct from the blast furnace into the converter lined with burnt dolomite. For the rest, the process is carried on as usual at similar German works. It is not customary, however, to recarbonize the soft basic Bessemer metal. The Thomas slag obtained is used as a fertilizer throughout the country.

The loss by waste in the Swedish Bessemer process varies between 7 and 10 %.

Sweden has twelve Bessemer works, with a total number of 27 converters, and the output of Bessemer metal in 1901 amounted to 77,231 tons.

The Open-hearth (Siemens-Martin) process. As early as 1866, regenerative heating furnaces were built at the Munkfors Iron works, belonging to the Uddeholm works, and one of these furnaces was altered in 1868 to a small open-hearth furnace, in which the first experiments in this country were made under the guidance of Director *L. Rinman*, who had been in France the preceding year to study the process under Martin himself at Sireuil.

The development of the process was, however, very slow, only a few works making experiments with it, using very small furnaces of 1 to 2 tons' capacity with open regenerators. As fuel, producer gas from wood was used, and condensors for the separation of water in the gas.

In the decade 1881/90, the Siemens-Martin process, however, made very considerable progress. The furnaces were made larger, 5 to 10 ton charges, ore began to be used for the refining, the regenerators were made closed with separate flues and ports for gas and air, and producer gas from fossil coal was used as fuel.

The open-hearth process won more and more recognition and came more and more into demand, especially for horse-shoe nails and wire-rods. The metal also came in use for different kind of castings, such as rolls, cog-wheels, anchors, anvils, etc., and open-hearth works were built in 1883 at Bofors for the manufacture of guns. During the last decennium, the size of the furnaces has been still more increased, and the basic open-hearth process has also been introduced.

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The open-hearth process is, like puddling, a refining process, but the heat must here be very much higher, because the iron, after the refining is completed, is to be tapped from the furnace, which requires a temperature of 1,500° to 1,800° C., according to the percentage of carbon in the iron, and in consequence of the high temperature, the chemical reaction at the refining will also be somewhat different.

As raw-material, pig iron and wrought iron (scrap) are used in quite varying proportions, but silicon and manganese as well as more or less of carbon must always be oxidized and removed. The oxidation of these substances takes place, partly directly by the flame passing over the furnace hearth, partly indirectly by means of the silicate of protoxide of iron which floats on the surface of melted iron in the form of slag, the oxidizing capability of which is increased by an addition of iron ore, or the like. The bottom of the furnace, or the hearth, must be of a very fire-proof material, and as such quartz (silica) or lime and magnesia (burnt dolomite) is chosen.

When quartz-brick or gannister is used for the bottom of the furnace (acid open-hearth), the slag must be rich in silicic acid, in order to protect the hearth, but an acid slag lessens the tendency of phosphorus and silicon (which form acids) to oxidize. In acid open-hearth, therefore, the phosporus remains entirely in the iron, but the silicon disappears more or less, in a lesser degree, however, at a higher temperature.

If steel of low percentage of silicon is to be made, the slag must be richer in iron and the temperature comparatively low, but then it cannot be avoided that the bottom of the hearth is considerably affected. If, however, the hearth consists of burnt dolomite or magnesia (basic open-hearth), the reverse is the case.

The slag must be kept basic by addition of lime, facilitating the oxidation of silicon and phosphorus, which then go into the slag as acids, and the combustion of the carbon is also accomplished quicker. The basic process, therefore, gives a very pure and soft product, which in its properties resembles wrought iron.

Fuel and Gas producers. For generating producer gas wood is generally used, also stumps or peat, sometimes fossil coal. Formerly condensers were always used, when the gas was obtained from a wet substance, such as wood or peat, but about 1890 Mr. *Odelstierna* made experiments with wood without condensing the water, which experiments gave such satisfactory results that condensers are no longer used for gas from wood or stumps, provided these fuels previously have been well air-dried.

Frequently a mixture of these different fuels, such as of wood and fossil coal, etc., is used.

For the generating of gas, shaft-shaped furnaces (producers) are always used, which are furnished at the bottom with grates, namely a flat grate for wood or stumps, and a step-grate for coal; for peat the producer is constructed without a grate, only with bricked flues for admitting the air at the bottom of the furnace. The air is forced into the furnace by a fan and thus the gas escapes from the producer under a somewhat higher pressure than the atmospheric one, but the products of combustion in the open-hearth furnace are removed by chimney draught. Preferably, small producers are used, so that a large 10 to 15 ton open-hearth furnace usually has two producers.

The open-hearth furnace. In order to get a sufficiently high temperature it is necessary, as is well known, to use regenerative furnaces in this process.

In the acid process, the hearth is laid with quartz-brick, usually Dinas-brick, on the top of which a layer of crushed quartz is fused. But for the basic process the hearth, lowest down and nearest the hearth-slab, consists of ordinary fire-brick; then a layer of magnesite-brick, on the top of which into is rammed a layer of burnt dolomite mixed with tar.

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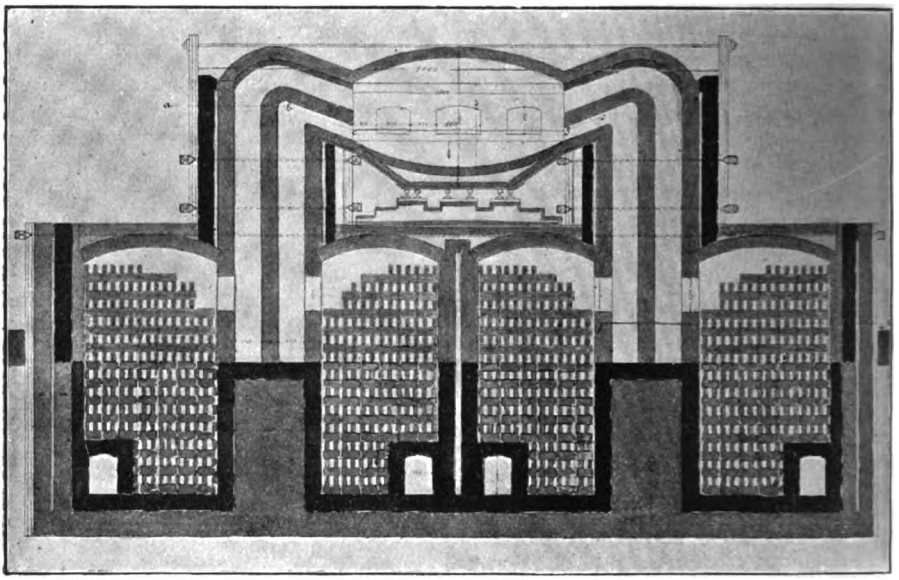
The regenerators are generally placed under the furnace, and from them the gas and air are conducted through separate flues into the furnace. The roof of the furnace is always laid with Dinas-brick, as are also the gas and air-ports and the inner surfaces of the walls. The figure below shows a Swedish open-hearth furnace.

Acid open-hearth process. At the different open-hearth works the composition of the charge varies very considerably according to the supply of raw-material at hand and the purpose for which the iron is intended. There are, for inst., open-hearth works which use 73 % pig iron and 7 % wrought iron scrap and 20 % iron ore, and others which use 74 % scrap and 26 % pig iron without addition of ore.

First the pig iron is charged cold, or the pig iron together with a small proportion of scrap, and after this is melted, scrap is charged in smaller quantities according as the refining proceeds, and finally ore to hasten the refining.



Open hearth Furnace.

The pig iron is always charged cold, for during the melting period silicon and the largest part of manganese are oxidized, but after the iron has been melted, the oxidizing of the silicon proceeds very slowly in acid open-hearth, and thus there is no time saved at all by charging the pig iron in a molten state on the furnace, rather the contrary; but in the basic process the case is reversed, as above mentioned, and both time and fuel may be saved by charging the pig iron in liquid form. A small percentage of silicon in the iron after the melting period is, however, advantageous, inasmuch as the boiling (the escape of carbonic oxide) becomes less violent. By the contact of the slag high in iron with the melted metal, the carbon in the iron is oxidized and escapes as carbonic oxide with bubbling.

But the oxidizing capacity of the slag depends on its composition and temperature, thus namely that the slag, in order to act oxidizing, must have a greater percentage of iron at a lower temperature than what is required at a higher.

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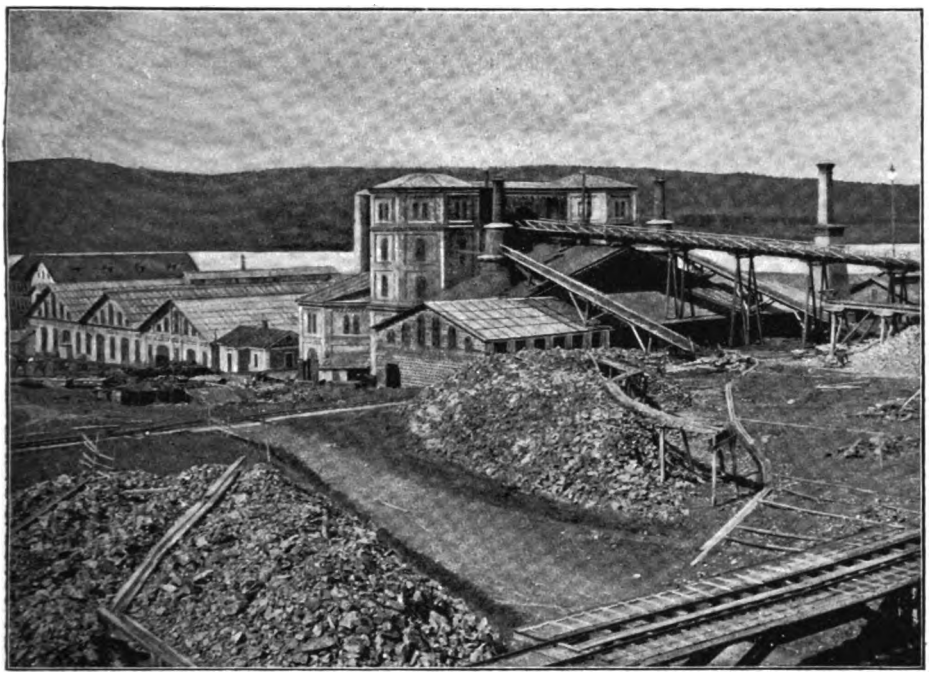

Hagfors Iron Works.

Now, since the percentage of iron in the slag decreases in the same degree that it oxidizes the carbon, it follows that either fresh oxidized iron must constantly be added to the slag, or the temperature be increased, unless the refining (the oxidizing of the carbon) is to cease entirely. Such a case is not to be feared, however, for after the melting of the iron the furnace temperature always rises gradually and the slag is supplied with oxidized iron, partly by small drops of melted iron being thrown up by the bubbling caused by the escaping carbonic oxide, which drops are immediately burned by the flame to oxide, which is absorbed by the slag, and partly by a special addition of iron ore in case the refining proceeds too slowly or shows signs of ceasing.

With rising temperature the percentage of iron in the slag, as a rule, decreases and consequently gets more acid and thick.

This circumstance makes it possible to judge to a certain degree of the percentage of carbon in the iron by the appearance of the bubbles formed when the carbonic oxide leaves the slag, for in the beginning, when the percentage of carbon is high, the slag is very rich in iron and flows easily and the bubbles seem high and pointed, but as the percentage of carbon decreases and the temperature rises, the slag becomes thick, and the bubbles round and flat.

After the first part of the charge is melted, fresh charges of wrought iron scrap are made with $^1/_2$ an hour's to 1 hour's intervals, depending upon the nature of the boiling. This scrap generally contains some oxidized iron in the form of rust or scales, which hastens the refining, but as the percentage of carbon decreases, the oxidizing of the carbon becomes more difficult, wherefore more powerful oxidizing agents are used, such as rich iron ore, which is added from time to time, while a sample of the iron is taken between each addition of ore, until the percentage of carbon has come down to the desired point.

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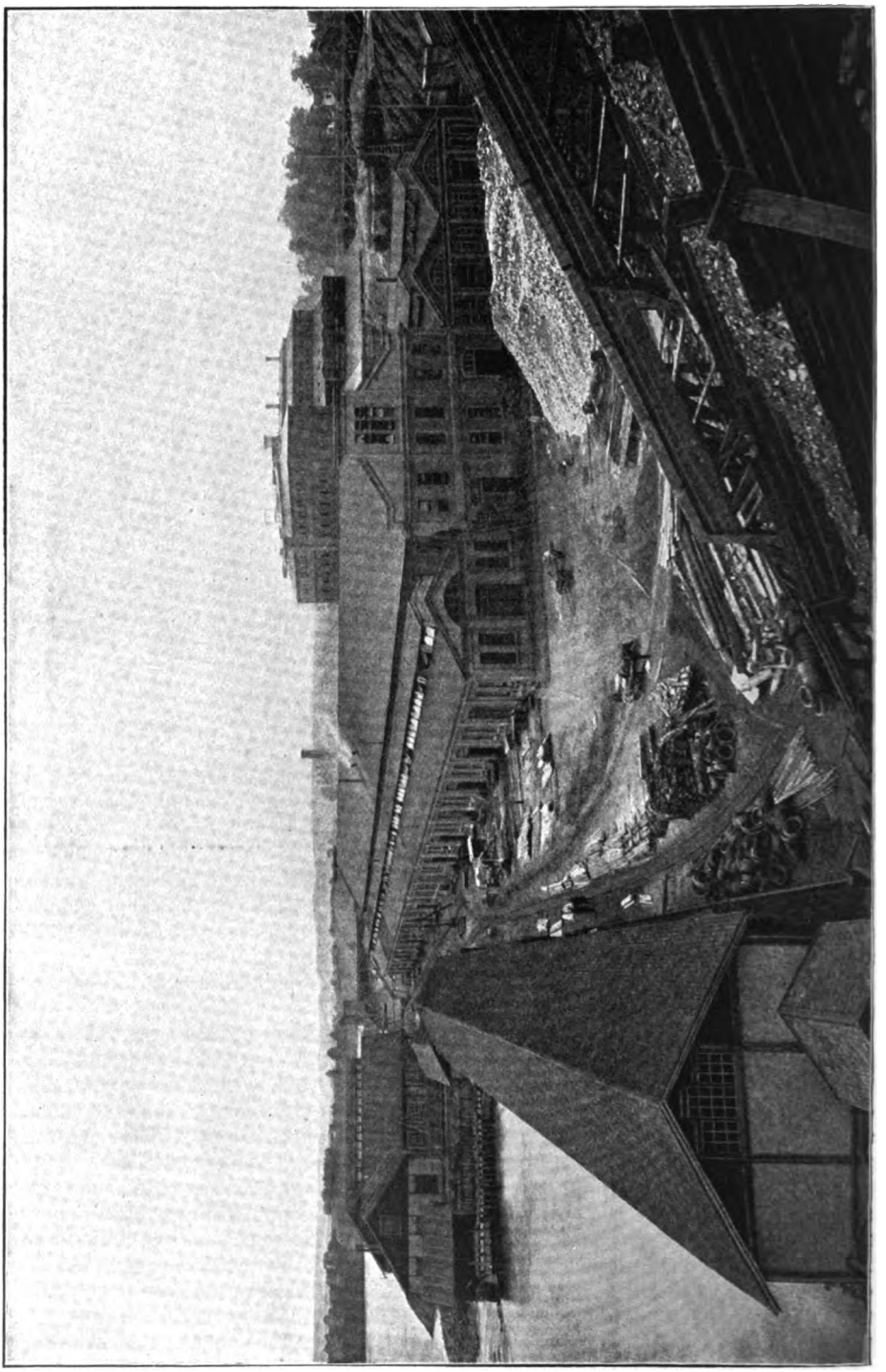

Domnarfvet Iron Works.

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When the percentage of carbon is low and the temperature high, the iron has a tendency to take up protoxide of iron from the slag, which causes red-shortness, and which must be removed by an addition of ferro-manganese or silico-ferro-manganese.

Frequently ferro-manganese with a percentage of iron under 0·40, is used for iron and silico-ferro-manganese for steel.

This addition is generally made in the furnace just before the iron is tapped, but on account of the acid slag, a large portion of the manganese is oxidized and goes into the slag. If, instead, this addition is made in the ladle, a smaller quantity of manganese is required, but the mixture is frequently less complete.

When the open-hearth metal is to be used for castings, silico-ferro-manganese is always added in order to obtain a solid product free from blowholes.

The tapping hole is closed during the process by a fire stone surrounded on all sides by quartz, and when the iron is to be tapped the stone is pushed into the furnace, whereby a sufficiently wide opening is made for the iron very quickly to run out into the ladle placed under the tapping hole. From this ladle the iron is poured into the moulds in the ordinary manner.

For special steel, an addition of chrome or nickle is used, of the latter metal 0·5 to 3 %, according to the purpose for which it is to be used.

After the tapping the hearth is carefully cleaned of molten iron, and cavities in the bottom of the hearth are fixed and smoothed over by filling the same with quartz. For such repairs, 1 up to 6 hectoliters of the quartz are required, depending upon how far the hearth has been burned out.

As soon as the mass is applied, the furnace is heated to such a temperature that the quartz begins to fuse, and the furnace is ready for a new charge. On account of these constant, small repairs, which only take $^1/_2$ to $^3/_4$ of an hour each, the same furnace bottom can be used for a long time, half a year or more. The furnace bottom is affected the most when the temperature is low and the slag is rich in iron, as when a steel low in silicon is to be produced. During the process of refining, there is plenty of time for taking samples of the steel, and for ascertaining the hardness of the metal by means of forging tests. These tests are the same as in the Bessemer process.

The time required for refining a charge varies considerably, from seven to twelve hours, according to the different proportions of pig iron and wrought iron scrap used for the charge. The consumption of fuel is 250 to 300 kilogr. of fossil coal or 30 to 40 hectoliters of wood or stumps per ton of ingot.

The basic open-hearth process is carried out in about the same manner as the acid. In order to protect the basic material of which the hearth is built, from being affected by silicic and phosphoric acid, which are formed in melting the pig iron, lime is added both at the charging of the furnace and during the process of melting. Generally slaked lime is used, for raw lime causes a violent bubbling and swelling when the carbonic oxide escapes. Also here, ore is used to hasten the refining, though in smaller quantities, because all substances which, on being oxidized, form acids, such as silicon, phosphorus, carbon, and sulphur, oxidize more easily; a basic slag and a basic lining being at hand.

Manganese, however, which forms a basic oxide, is oxidized more slowly than in the acid process and remains partly in the iron. For this same reason less iron is oxidized, wherefore it is usual to add in the beginning, besides lime, some iron ore, to make the slag sufficiently rich in iron. This ore ought, of course, preferably to be calciferous. The more silicon and phosphorus the charge contains from the beginning, the more lime is required, but at the same time the volume of slag increases, which makes the refining more difficult. The

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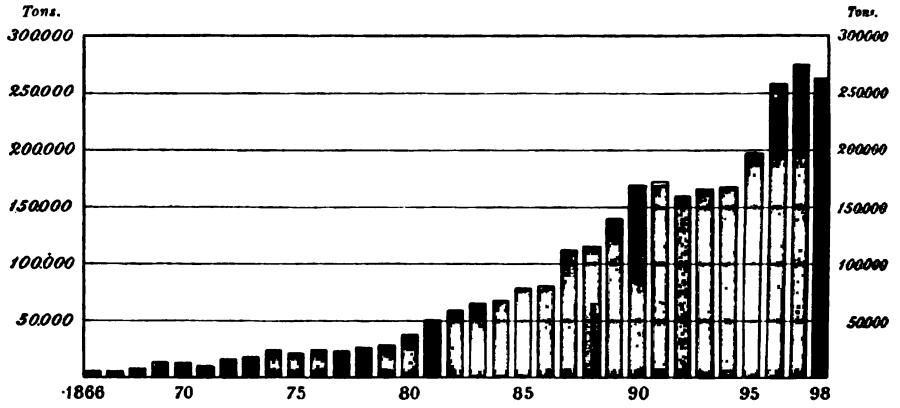
Sweden's production of Ingot metal (steel), in the years 1866/98.[1]



amount of silicon in the charge ought therefore not to exceed 0·5 % and the phosphorus not 0·22 %. After each tapping, the bottom of the hearth is repaired by filling all holes with dolomite-mass. Roofs and ports are built of Dinas-brick, and magnesite brick is used as isolating substance between the basic and acid materials.

The charge in a basic furnace can be refined in a shorter time, 6 to 8 hours. In order to remove red shortness, an addition of ferro-manganese is used here, as in the acid process, but as manganese does not so easily oxidize, the amount of such iron required is less. The reverse is the case with ferro-silicon, and therefore, when such iron is to be used, it should be added in the ladle after the metal is tapped. — The acid open-hearth is best suited for making steel castings, while the basic is most suitable for the production of soft iron.

In 1901, there were 48 open-hearth furnaces in Sweden, the total output of which was 190,877 tons of open-hearth metal, 80,097 of which were produced by the basic process.

Blister steel. This method of making steel consists, as is well known, in putting soft iron, low in carbon (bar iron), together with charcoal powder into large box-shaped vessels, called chests, made of fire brick or sandstone, after which the chests are heated, when the iron placed in them takes up carbon and is changed into steel which is called blister steel.

TABLE 107. *World's production of Ingot metal (steel).* Metric tons à 2,204 *lbs.*

Countries.	Average 1871/75.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1900.
Sweden	17,144	63,763	122,289	173,465	274,374	300,536
Great Brit. and Irel.	572,786	2,001,691	3,323,478	3,130,344	4,743,158	5,130,800
Belgium	27,040	170,173	219,020	325,894	650,913	654,827
Germany	318,150	1,086,982	1,818,464	3,217,336	5,685,771	6,361,650
Austria-Hungary	45,300	211,258	357,097	485,000	602,700	675,000
France	168,064	492,301	514,600	674,800	1,405,702	1,624,048
Russia	9,591	252,044	241,670	438,260	1,147,594	1,830,260
United States	207,498	1,679,257	3,343,844	4,748,773	8,589,287	10,382,069
Other countries	25,000	25,000	225,000	383,400	532,268	608,634
Total	**1,390,573**	**5,982,469**	**10,165,462**	**13,577,272**	**23,631,767**	**27,567,824**

[1] In the years 1899/1902 the production has been resp. 273,000, 301,000, 270,000, and 287,000 metric tons.

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The amount of carbon thus absorbed by the iron depends upon the temperature, the higher it is, the more carbon unites with the iron, while the time of the heating principally helps only to make the carbon penetrate more easily from the surface of the iron to its center.

Since in this process no substances leave the iron, it is necessary that it is from the beginning very low in silicon, phosphorus, and sulphur.

The Swedish hearth-fined iron, made from the most phosphorus free ores of Sweden, such as those from Dannemora and Persberg, etc., is an excellent material for making blister steel. During the whole of the past century, blister steel has been made in Sweden, but only in small quantities, 1,000 to 2,000 tons annually.

The furnaces here used are ordinary English blister steel furnaces with two chests, each holding 10 tons of bar iron, for the packing of which is required 17 hectoliters of pulverized birch-charcoal, dampened with a little salt water. The consumption of fuel depends upon how large the percentage of carbon is to be in the steel, but is on an average 3·5 cubic meters of fir and 2 cubic meters of birch-wood per ton of blister steel. The time required for a charge is three to four weeks. One week is required for the packing of the bar iron in the chests, about one week and a half for the burning, and about the same time for the cooling of the furnace. During the cooling, the amount of carbon is increased by about 0·3 %. — In 1901, 701 tons of blister steel were produced in six furnaces which were then in operation.

Crucible steel. There are only two works in Sweden for making crucible steel, one at Österby, the other at Vikmanshyttan.

At *Österby*, the Dannemora steel, so renowned for its excellent quality, is produced, the raw-material for which is blister steel made by Walloon-forging of first-class Dannemora pig iron. The steel works, which have regenerative furnaces for heating the crucibles, were founded in 1871. The crucibles are made at the works from English fire clay mixed with a few per cent of coke. They are subjected to a very slow drying process and are brought to a red heat before being put into the crucible furnace. Each crucible is charged with 20 kilograms of blister steel together with a few other admixtures, and the melting is done in about four hours. Thus, three heats are made with the same crucibles in twelve hours, after which they are discarded. In the producer for the crucible furnace

TABLE 108. *Imports and Exports of part of the Iron and Steel manufacture.* Metric tons à 2,204 *lbs.*

Average for the years	Rails, etc.[1]		Plates.		Average for the years	Rails, etc.[1]		Plates.	
	Imports.	Exports.	Imports.	Exports.		Imports.	Exports.	Imports.	Exports.
1861/65.....	14,848	5	684	621	1891/95.....	29,537	160	3,723	3,489
1866/70.....	3,863	161	1,271	644	1896/00.....	52,706	945	9,331	3,066
1871/75	38,009	488	3,344	828					
1876/80.....	26,392	270	3,577	1,482	In 1898	55,014	1,082	9,502	3,019
1881/85.....	25,357	19	6,901	2,591	» 1899	87,453	1,899	8,367	2,933
1886/90.....	25,851	168	4,631	5,076	» 1900	45,424	604	12,356	2,441

Note. Rails are reported in the Mining Statistics as heavier manufactures but in the Commercial Statistics are included among Iron and Steel-ware. — Plates reported just above comprise all sorts, and are entered in full in the Commercial Statistics under the head of »Metals, unmanufactured or partly manufactured»; in the Mining Statistics, entry is made only of »heavy plates».

[1] Including sleepers, fish-plates, etc.

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fossil coal is used, and the amount required is about 150 tons per ton of steel. – The output was 398 tons in 1901.

At *Vikmanshyttan*, however, cast steel is made from granulated pig iron (pig iron which has been caused to run into water), roasted iron ore (about 20 %), and a little charcoal powder, with which mixture the crucibles are charged, and after preheating are heated in draft furnaces. This method of making steel (discovered by the Austrian *Uchatius*) was introduced at Vikmanshyttan in 1860. In 1901, the output there was 647 tons. Also this steel is of excellent quality.

Electro-Steel. The so-called Electro-steel is manufactured at the Gysinge Works according to a method recently invented by the Swedish Engineer *A. Kjellin.*

It is made out of Dannemora iron by smelting in an electrical furnace. This is of the Transformer type, i e., the melted iron serves as the secondary coil. The crusible is a circular ring-shaped tube of fire-proof material. The furnace is fed by a single-phased current of 3,000 volts' tension, and requires an electric power of 165 kilowatt. Hereby 4 tons of steel are produced per diem. The furnace can hold 1,800 kilograms, of which 1,000 kilograms are tapped at a time. The steel produced is distinguished by being of very superior quality; it is dense and free from blister, easily worked in the unhardened state as well as tenacious. Already this steel has found an important use for manufacturing finer edge tools of the most superior quality. It is produced with many different percentages of carbon, and also as Chrome and Wolfram steel.

Statistics. The production of ingot metal, from 1871, in the principal countries is presented in Table 107, p. 750. The diagram p. 750 shows the amount of production in Sweden for each year, from 1866 to 1898 inclusive, and Table 101 on page 707 gives some specifications. In these Tables the whole production of Bessemer and Martin ingots is included.

The *exports* of ingots amounted, during the quinquennial periods 1881/1900, in yearly averages to 743, 6,316, 5,146, and 8,192 metric tons respectively; in 1900, the corresponding figure was 8,974 tons, of which 5,324 tons to the United Kingdom and 2,294 tons to Germany. The *imports* and exports of a couple of important articles on a lower degree of manufacturing, i. e., rails and plates, is to be seen in Table 108, p. 751. The large imports of rails do not depend on the Swedish manufacturers not being able to produce rails — as is fully shown by the preceding — but on the impossibility of competing in low prices with the larger manufacturing establishments abroad, specially devoted to production in mass.

3. OTHER MINERALS AND METALS.

Leaving iron out of consideration, mining in Sweden is of minor importance. **Import** and **export** figures for products under this category also give the negative result shown by Table 109, p. 753.

The importation of coal has previously been dealt with on page 684. The importation of other *minerals* embraces a great number of items, of which Chilian saltpeter (2·64 million kronor, in 1902), salt (1·91 million), caustic potash (1·89 million), superphosphate (1·97 million),

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TABLE 109. *Imports and exports of minerals and metals, except iron.*[4]

Average for the years	Imports. Value in thousands of kronor.				Exports. Value in thousands of kronor.		
	Fossil coal and coke.	Other minerals.[2]	Metals.[3]	Total.	Minerals.[2]	Metals.[3]	Total.
1871/75	13,452	5,303	6,391	**25,146**	826	3,214	**4,040**
1876/80	12,719	5,634	5,833	**24,186**	1,217	2,164	**3,381**
1881/85	15,847	8,047	4,326	**28,220**	1,463	1,751	**3,214**
1886/90	22,560	9,036	5,257	**36,853**	3,226	639	**3,865**
1891/95	29,770	10,854	5,498	**46,122**	4,890	1,023	**5,913**
1896/00	53,494	15,701	12,883	**82,078**	7,582	1,375	**8,957**
In 1900	85,026	19,026	18,496	**122,548**	9,462	2,492	**11,954**

and sulphur together with flowers of sulphur (2·07 million kronor), are the most important. The export within this same group also embraces a number of smaller articles, the most important being zinc ore (1·93 million kronor, in 1902), rough stone (2·21 million), and cement (0·51 million). As it appears, here as well as in the classification of commercial statistics, the term Mineral is used in a somewhat more extensive sense than is commonly the case in the Swedish language.

Of *other metals* than iron, we imported, in 1902, copper and copper alloy together with metals not specified, for a total of 8·62 million kronor, zinc for 1·26 million, tin for 1·38 million, lead for 0·87 million, silver for 0·31 million, gold (uncoined) for 2·34 million, etc. The exports embrace about the same articles, but always in smaller quantities than the imports.

Table 110 gives a statement of the **production** in Sweden since 1861 of gold, silver, lead, copper, and some other more important mining products.

During the whole of the 19th century the production of *gold* amounted to 1,716 kilograms.[5] With respect to *silver* Sweden possesses statistics concerning the production for a greater succession of years than most other countries, namely right from the year 1400.[1] The production during the several periods has amounted to[5]:

In	Kilogr.	In	Kilogr.	In	Kilogr.	In	Kilogr.
1400/93	61,591	1601/00	60,728	1831/40	8,095	1856/60	5,548
1506/43	52,881	1701/00	36,508	1841/45	4,794	1861/00	78,833
1544/51	22,718	1801/20	7,894	1846/50	6,271		
1560/00	19,432	1821/30	5,621	1851/55	6,329	Total[1]	**377,243**

Making allowances for the years missing, the whole production during the last five centuries may be estimated in round figures at 400,000 kilograms.

A number of the minerals included in Table 109 above (compare the text following the Table) are dealt with in different parts of the

[1] Figures are, however, not to be had for the years 1494/1505 and 1552/59. — [2] Except iron ore. — [3] Except iron and steel. — [4] A krona = 1·10 shilling or 0·268 dollar. — [5] A kilogram = 2·204 *lbs.*

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TABLE 110. *The manufacture of certain mining products, except iron.*[1]
(A kilogram = 2·204 *lbs.* A quintal = 220·4 *lbs*).

Average for the years	Gold. Kilog.	Silver. Kilog.	Lead. Quintals.	Copper. Quintals.	Sulphur. Quintals.	Vitriol of iron. Quintals.	Sulphate of copper. Quintals.	Alum. Quintals.	Lead ore. Quintals.
1861/65.....	14·90	1,129	4,448	17,312	3,000	4,372	316	8,773	376
1866/70.....	8·23	1,185	3,958	20,033	4,497	3,637	946	9,121	247
1871/75.....	5·13	780	536	11,624	3,092	5,221	1,368	6,076	495
1876/80.....	5·78	1,117	720	9,250	2,003	2,662	1,747	3,602	479
1881/85	24·80	1,713	2,694	7,708	2,465	4,027	—	2,312	298
1886/90. ...	77·58	4,254	2,744	8,353	562	4,668	3,038	5,422	204
1891/95.....	93·90	3,478	6,360	4,796	350	3,609	7,538	3,606	388
1896/00.....	109·70	2,110	15,196	2,174	394	1,669	13,077	1,898	566
In 1900....	88·48	1,927	14,239	1,360	700	1,830	12,649	1,672	846

following chapter on manufacture, especially the Chemical industry. The most important metals, together with the corresponding raising of ore, are summarized here. Regarding the **breaking of fossil coal**, it has already been dealt with in a previous chapter in connection with reports on the iron mines.

Copper. Next to iron, copper is the most important of the metals produced in this country. Formerly the production of copper was carried on in several different places, and at nearly every mine accessible, but now it is limited to the copper works at Falun, Åtvidaberg, and Kafveltorp, and of late years also is carried on at the Superphosphate works of Helsingborg as an important subsidiary industry, copper (and silver) being extracted from the waste obtained in producing sulphuric acid from cupreous sulphur pyrites. At the firstnamed of these works, the ore is mined at the *old mine of Stora Kopparberg* (Falun), of which mention is made over 600 years ago. The *Åtvidaberg* copper works get their ore from the adjacent Bersbo and Steffenburg mines. *Kafveltorp* gets its ore from the mines bearing the same name. The *Helsingborg* copper-works, which formerly imported their sulphur pyrites from Rörås in Norway, have of late begun to take ore from the newly discovered, vast pyrite deposits near Sulitelma (likewise in Norway). Besides at these works, copper was formerly produced at several other places in the kingdom, e. g. at Riddarhyttan, Håkansboda, Virum, Huså, Kengis. etc., but now the production of copper at these places has ceased, partly for lack of ore, and partly on account of the low prices of copper. In all these places, copper occurs almost exclusively in combination with sulphur, such as copper pyrites, mostly sprinkled into the siliceous mineral, or in intimate combination with sulphur pyrites. The ores now worked contain on an average 3 % of copper.

[1] Here are not included certain intermediate productions, a number of which are manufactured in no small quantities, such as, in 1900, precipitate of silver 6,966 kilogram, raw and antimonious lead 21,709 quintals (à 220·4 *lbs.*), cement and raw copper 12,263 quintals, as well as roasted zinc blende 267,720 quintals.

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TABLE 111. *Imports and exports of certain unmanufactured or partly manufactured metals, except iron and steel.*

Average for the years	Gold. Kilog.	Silver. Kilog.		Lead. Quintals.		Copper.[1] Quintals.		Zinc. Quintals.		Tin. Quintals.	
	Imports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1861/65	56	5,007	10	1,513	1,549	1,957	14,875	3,654	45	555	3
1866/70	113	8,407	3,083	1,522	2,975	2,678	18,045	2,981	207	372	7
1871/75	1,639	9,964	6,054	4,810	1,373	5,772	9,098	6,583	183	1,352	34
1876/80	1,492	1,002	1,729	5,934	787	7,676	6,941	9,592	567	1,613	3
1881/85	659	426	1	6,452	2,528	10,845	7,554	16,645	210	2,260	11
1886/90	985	876	168	9,104	1,866	12,330	6,619	17,651	519	2,500	72
1891/95	386	2,659	2,849	15,147	7,086	32,808	5,373	19,520	860	3,521	114
1896/00	1,849	12,779	388	20,549	10,457	50,213	11,546	27,078	1,621	5,419	190
In 1900	3,263	9,128	296	20,672	12,091	61,499	20,119	29,126	1,556	6,297	215

Formerly the **copper percentage** was frequently determined by the so-called *Swedish copper test*, which was quite suitable for pure ore. The method was as follows: After the ore had been dissolved in a mixture of hydrochloric or sulphuric acid and nitric acid, and the silicic acid had been separated, the copper was precipitated on a clean-filed iron spike from the diluted boiling solution. The copper-free solution was poured off, and the copper washed with water that had been boiled, after which the still loosely adhering copper was removed from the iron, and after a hurried drying, was either direct weighed as metal, or, after being dissolved in nitric acid in a porcelain crucible, was determined as oxide or sulphate. Besides this, several other methods have come into use, e. g., precipitating with hyposulphite of soda from a boiling solution of sulphate and determining as oxide or sulphate; furthermore titration of an ammonia solution, with cyanide of potassium, etc. Now precipitation of copper according to the *electrolytic method* is generally used. For determining very small percentages of copper, etc., also a Swedish method is used, viz. Professor *V. Eggertz' colorimetrical method.*

Up to the beginning of the decennium 1871/80, shaft-furnaces were used for **melting** the ore, according to a method which in metallurgy has been given the name the *Swedish copper process*, in contradistinction to the English process, which is exclusively executed in reverberatory furnaces. On account of the slight percentage of copper in the ore, and the rising prices of fuel, this method of melting has had to be abandoned. The wet or *extraction method* was introduced in Falun in the beginning of the seventies, and afterwards at several of the present copper works. According to this method, the ore is roasted with chloride of soda at a low temperature, and the dissolvable salts are extracted by means of water mixed with some hydrochloric or sulphuric acid in large wooden basins. From this solution, silver is first precipitated, and then the copper is cemented by means of iron scrap. The **cement-copper** thus obtained, which contains 70 to 80 % of copper, is toughened and refined in regenerating reverberatory furnaces.

The production of copper is shown by Table 110. For the sake of comparison, it may be mentioned that during the whole of the seventeenth century, the production of copper in Falun amounted to an an-

[1] Here are also included copper alloys, such as brass, bronze, electroplate, etc., as also metals not specified.

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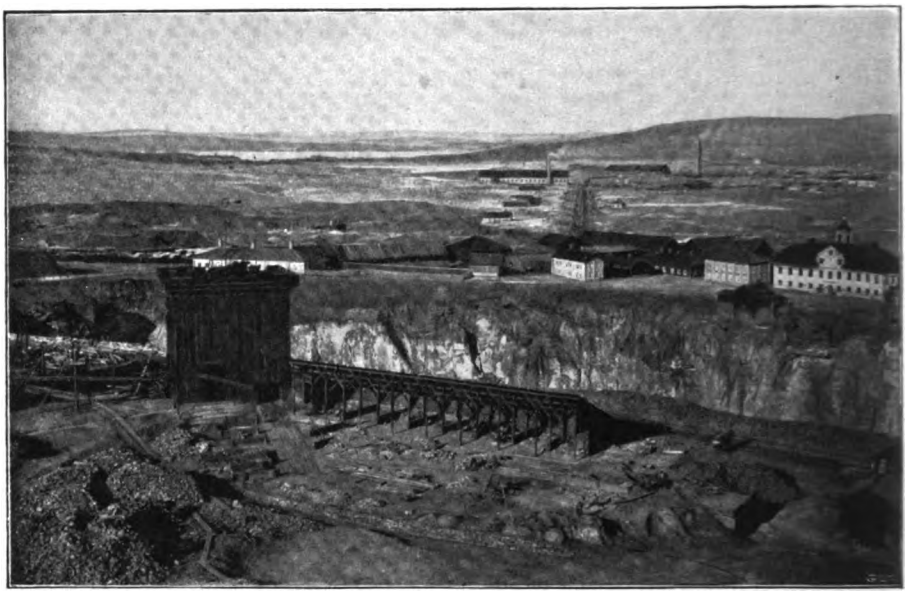
nual average of 1,760 tons. The total copper production at the said mines from the middle of the 13th century up to our time is estimated at over 500,000 tons, which is more than has hitherto been produced by any other copper mine in the world. Still the said total amount does not correspond to more than a *year's production* from all countries together at present.



The Falun Copper mine.

From an historical point of view, this should be the proper place to devote some attention to one of the most interesting events in the history of Swedish trade. **Stora Kopparbergs Bergslags Aktiebolag** * is the oldest company in Sweden and probably *the oldest industrial corporation now existing in the world.* Its origin dates back more than 600 years; in a Royal sanction of 1347 confirming its privileges is spoken of »prior, of old existing letters of privilege, which have been lost». The original object of the company was to work the rich *copper mine* at Falun. The Government, which, in consequence of the asserted regal nature of the mine, during centuries has had great influence over the activity of the company, has been in receipt of a rent (tax) from it which was so considerable during the 17th century that the heavy war expenses of that time were to a very great extent covered by it. The year 1650 shows the maximum production, which amounted to 3,067 tons. Afterwards the production gradually decreased, but for nearly two centuries, nearly up to 1750, the company was the greatest copper producer in the world. In 1642, the company erected the Avesta *Copper refining works.* In 1689, the Domnarfvet *Sawmill* was taken over, and gradually also forests were purchased. In 1735, the company finally extended its activity to *Iron production.*

Now, as is well known, the production of copper plays but an inconsiderable part in the affairs of the company; it has instead become the greatest producer

* I. e., The Joint-stock Mining Company of Stora Kopparberg (at Falun).

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of iron and steel, and the greatest exporter of forest products. The company now owns no less than 300,000 hectares of forest (750,000 acres or about half the area of all forest in England), and has erected the largest saw-mill in the world at Skutskär, where the company also has an important wood-pulp manufactory. At Kvarnsveden it has recently erected a combined pulp-manufactory and paper-mill at a cost of 3 million kronor. The company's iron works at Domnarfvet are touched upon in many places in this work; they are incomparably the greatest of their kind in Northern Europe. The total amount of the company's assets is estimated at more than 40 million kronor.

The name of this corporation was originally Kopparbergslagen. The shares were called »fourth parts», and, in 1615, were fixed at a number of 1,200; they were declared as *real* estate by special law, so that acquest of such share had to be registered as real estate. In 1890, a reconstruction took place resulting in the corporation emerging into a joint-stock company formed upon modern lines, and at this change every »fourth-part» was exchanged against eight shares of one thousand kronor each, so that the joint capital amounts to 9·6 million kronor. The Board has its seat in Stockholm, but the acting manager resides in Falun, where the head offices for the management of the works are still situated. The shares are held solely by Swedish subjects and corporations, and, to a smaller part, by the State. — Up to 1896 inclusive, the company had from the commencement of its activity broken 35 million tons of copper ore and rock, produced 500,000 tons of copper (to a value, including byproducts, of over *one thousand million kronor*); further, 16,000 kilograms of silver, and 1,200 kilograms of gold, besides a great number of other mining products. In its iron production it has utilized 1,600,000 tons of ore and produced 800,000 tons of pig iron, 544,000 tons of bar iron, 445,000 tons of Bessemer and Martin ingots. Its timber trade has embraced $22^1/_2$ million logs of sawn timber, which made 1 million standards of sawn timber; 55 million loads of charcoal have been consumed. Most of these quantities have very considerably increased since 1896. For the years 1897/1902 the dividends paid have amounted to 10, 12, 14, 14, 12, and 14 % respectively, besides which the compay has erected several new establishments out of the profits instead of borrowing the funds necessary.

In our days, the copper production is not able to fill home demands, which is shown by the fact that, in 1902, the import of raw copper and copper waste amounted to 5,803 tons, while the export was only 1,447 tons, and the import of plates, etc., amounted to 1,087 tons, while the export did not go higher than 70 tons. The imported copper as well as that produced in the country, is used partly by mechanic shops, and partly for the making of brass at Skultuna, Torpshammar, and Gusum. Besides this, some is worked into plates, wire, and pipes at Skultuna and Granefors, and, finally, some is used by copper-smiths for making cooking-vessels, etc.

Zinc. Sweden possesses quite considerable quantities of zinc ore; this consists exclusively of zinc-blende or sulphide of zinc. Of all the zinc ore mined in Europe in 1896/1900 (1,118,838 tons per annum), Sweden has contributed 57,701 tons, or 5·16 %. In 1898 and 1899 our share was even 5·52 %. The total production of Sweden amounted in 1902 to 48,783 tons; see further Table 95, on page 682. Metallic zinc or any preparation thereof is not manufactured in Sweden, all the ore

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being exported. The incomparably largest zinc-blende deposit *Åmmeberg*, in the Län of Östergötland, is even owned by foreigners, namely by the Belgian company Vieille Montagne. The Åmmeberg ore is roasted there previous to exporting.

During the quinquennial periods 1861/1900, *Sweden's exports of zinc ores* amounted in yearly averages to:

Average.	Metric tons.	Average.	Metric tons.	Average.	Metric tons.
1861/65	3,716	1876/80	18,761	1891/95	29,064
1866/70	11,998	1881/85	22,165	1896/00	44,387
1871/75	11,778	1886/90	26,589	In 1900	40,879

The value of the exports of zinc ores in 1902 is estimated to 1,928,000 kronor. Of the total (43,813 tons), 29,929 tons were exported to Belgium, 7,395 tons to France, 1,425 tons to Germany, and 5,064 tons to the Netherlands.

Nickel. Nickel ore is found in several places in combination with magnetic pyrites in such large quantities that it was formerly worked, but of late the mining of this ore has ceased. The process of producing nickel at the two nickel-works Klefva and Sågmyra in many respects resembled the old copper-melting process: the removal of the greater amount of sulphur, arsenic, and iron by repeated roastings and meltings, furthermore refining, roasting, and reduction with charcoal, and finally the making of so-called pulverized nickel.

Cobalt occurs, though sparingly, in several places in the country, e. g. at Tunaberg, Vena, and Gladhammar. Besides at these places, cobalt occurs in considerable quantity together with copper ore at the Håkansboda and Riddarhyttan mines. In melting these ores, cobalt is precipitated, together with the iron and some copper, on the bottom of the furnace, forming so-called »nasar», which of late has occasioned the extraction of cobalt and copper by the wet process, by dissolving in diluted sulphuric acid, and precipitation of both metals. Also this production has now ceased.

Gold is produced almost exclusively at the *Falun copper works* by the extracting of ore residues, the silver and copper having first been extracted. Besides in certain shafts in the *Stora Kopparberg mines* (where gold occurs native, sprinkled in quartz together with selenium-bismuth), it also forms a constant constituent in all ore, both in the silicic copper-pyrites and in the sulphur-pyrites to an amount of five grams per ton (0·0005 %). The gold is extracted according to a Swedish method. After the silver and copper have been extracted from the carefully roasted ore, the remainder, which principally consists of quartz, silicate, and oxide of iron, is treated with a diluted solution of hypochlorite of lime, mixed with some hydrochloric or sulphuric acid, so that free chlorine is generated, whereby the gold is dissolved (*the Munktell process*). From the solution of chloride of gold thus obtained, the gold is precipitated with ferro-sulphate and plumbic acetate. The old *Ädelfors* mines, which were given up in 1874, have from 1890 been worked by a foreign company, which, however, also has abandoned the same. The *production* of gold in the country during different periods is shown by Table 111, on page 755. Of the total production of gold during 1902 (or 94·3 kilogram) no less than 92·5 kilog. were from the copper works in Falun.

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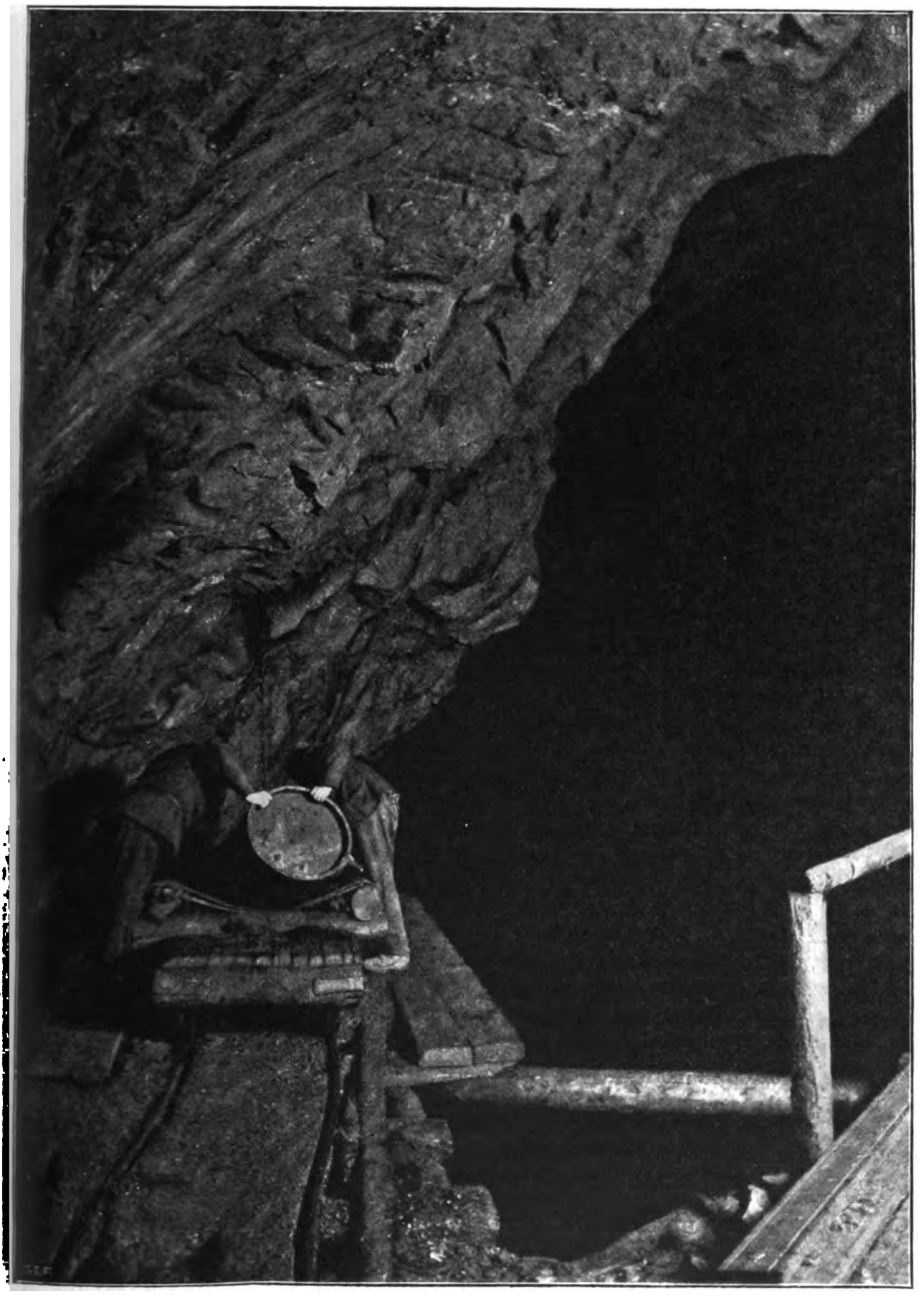

In the Falun Copper Mine. Photo. ALFRED DAHLGREN, Uppsala.

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For determining the *percentage of gold* in iron and copper pyrites as well as in silicic ores, *Plattner's tests* are used. After the ore has been crushed fine and perfectly roasted, 300 grams are weighed up, and in a somewhat damp condition this ore is subjected to the effects of chloride gas, after which the chloride of gold formed is extracted by means of an aqueous chloric solution. The surplus of chloride is expelled by means of evaporation, and the gold is precipitated with ferro sulphate, collected on a filter, and expelled, after its combustion, together with some silver and lead on a cupel of bone-ashes, after which the silver is liberated by boiling with nitric acid, and the remaining gold is weighed. — For determining the percentage of gold occurring in copper, regulus, etc., they are dissolved in nitric acid, and the remaining gold is treated as aforesaid.

Silver. Production of silver and lead now only takes place at *Sala* and *Kafveltorp*, where silverbearing galena is worked, and at the copper-extraction works at *Falun*, *Åtvidaberg*, and *Helsingborg*, where silver is procured as a by-product by precipitating from copper-solutions.

Among the aforesaid silver-works, *Sala* takes the foremost place. Its existence goes back as far as to the close of the fifteenth century, but it cannot be definitely determined how much earlier silver production took place there. The State has for many centuries supported these works by privileges consisting in grants of land and forests and in the right to get charcoal from adjacent parishes. On the other hand, the State had the right to conduct the works through the Board of Mines, and to hold for its own account $^1/_{10}$ of the silver produced. This state of things continued till the close of 1890, when the mine and the works were bought by a private company.

The production in Sala, which at the time of Gustavus Vasa (1523/60) amounted on the average to 3,000 kilogram annually, has of late decreased so that during the last decades it has only amounted to 2,000 kilogr. of silver and 1,500 tons of lead. Since the new company took over the mine, the production has again at certain times increased by the purchase of ore from other mines and by improved methods for enriching and melting the ore. Still the production amounted in 1902 only to 990 tons of marketable lead, and 957 kilogr. of silver.

The silver-percentage in the pure galena varies considerably in different parts of the mine and in different samples, namely from 1·5 to 0·25 %. The percentage has not been found to depend in any way upon the structure of the galena, such as being more or less granulated. On an average, the silver-percentage is such that the lead obtained contains 0·80 % of silver.

The silver-percentage of the ore, slag, etc., is determined either by the so-called »boiling» process, or by melting with carbonate of soda in iron melting crucibles. In making the »boiling» test — which is principally used for slags and alloys, especially when they contain copper and arsenic — 3 grams of the pulverized substance are mixed with granulated lead and melted together with borax in muffles in a so-called essayer of fire-proof clay, when some lead, together with foreign substances, becomes slag and is absorbed by the melted borax. When so much slag has been obtained that it covers the lead, and no further oxidizing takes place, the lead is poured into a chill and afterwards driven off on a cupel of bone-ashes.

Lead is not produced otherwise than in connection with silver, and only at *Sala* and *Kafveltorp*. Concerning the amount of the production, see Table 110, page 754. The world's total production during 1896/1900 amounted to 794,000 tons per annum; Sweden's contribution amounted to 1,520 tons, or only 0·2 %. In 1902 the Swedish production had decreased to 843 tons.

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4. MEASURES FOR THE PROMOTION OF MINING INDUSTRY AND METAL PRODUCTION.

Administrative affairs relating to mining were dealt with in former times by the Board of Mines (»Bergskollegium») instituted in 1630. In 1858, this office was abolished and its business conferred to the **Board of Trade** (until 1900 placed under the Home Department, but now under the Finance Department). After reorganization in 1891, one of the three bureaus of the said Board was set apart for mining affairs as well as industry in general. Concerning the so-called *Mine Map office*, which is under the same bureau, see page 705. The mining **statistics** are since 1858 being compiled by the Board of Trade; having of late been reorganized, they have gained considerably in reliability and value.

The Iron Institute (»Järnkontoret») is a financial institution peculiar to Sweden, organized originally with the object of rendering assistance to its members during bad conjunctures, as well as in general, by support and encouragement, of working for the promotion of the iron industry in Sweden.

The real founder of the Iron Institute was *A. Nordencrantz*. The Institute commenced its work in 1748. At first it was subjected to various regulations by the Secret Committee of the Riksdag, but since 1769, the Iron Institute has been in possession of full self-government. The regulations now in force are those confirmed by the Government on January 26, 1894, with amendments of July 26, 1901.

Most of the Swedish Iron works are part-owners in the Iron Institute, where they have a vote in accordance with the grounds prescribed, and pay annual contributions to the funds, amounting to about 0·59 kronor per ton of publicly weighed iron. The Board consists of 5 ordinary and 5 extra commissioners, each appointed for three years at the general meeting of the Society, the so-called Iron Riksdag, being held every third year.

The main *object* of the Iron Institute is to assist the members with loans on favourable conditions. Especially during the first period of its existence, the Iron Institute sent considerable sums of money to the large iron sales at the Fasting market in Kristinehamn, and during bad seasons the Iron Institute itself purchased iron from iron work proprietors. The Iron Institute has gradually limited itself to the granting af loans, advanced under various denominations, such as ordinary loans, extra loans, advance loans, accident loans, building loans, etc.

But, as mentioned above, the Iron Institute has also had another very creditable object, namely to *promote the advancement of the Swedish iron industry*. To this intent the institute has put aside a fund for investigations and experiments; made annual grants to mining schools, charring schools, and geological investigations; built a testing establishment for testing of iron and other building metals (now united with the similar institution at the Technical High School); granted a number of traveling stipends, and supported an official body of its own, consisting of technically educated persons for the practical assistance of iron work

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proprietors at their works; and spent considerable sums on the purchase of mining literature as well as on the publication of such literature. Ever since 1817, the institute has also published its highly reputed journal, »Annals of the Iron Institute» (Järnkontorets Annaler). On the whole, a very considerable share of the credit is due to the Iron Institute for the high standing which Swedish iron industry during the last hundred years has unceasingly striven to attain.

The Iron Institute has had no support from the State except during the first period of its existence, when the iron work proprietors received the right of raising money in the Bank of Sweden on publicly weighed iron, a provision which was since amended in so far that the Institute during the years 1818/70 enjoyed a credit of 900,000 kronor at 4 % interest with this bank. Excepting at one occasion of no importance, dividends have not been given to the members.

At the expiration of 1902, the Iron Institute had, in round figures, a capital of 4 million kronor, a Reserve Fund of 1 million kronor, and a so-called General Fund of 1·12 million, thus a total amount of over 6 million kronor.

Instruction with regard to this industry is now being given at one higher and two lower mining schools. The **Higher Mining school** was instituted in 1822 at Falun, but in 1868 it was removed to Stockholm and united with the Technical High School, under whose direction the Mining school stands, although it has its own principal.

Four regular teachers are engaged at the school, namely professors of metallurgy and the art of smelting, the science of mining and mining mechanics; as well as a lecturer on metallurgy and mining chemistry. Instruction is given in mining chemistry and general and special metallurgy, with an extended course in the metallurgy of iron; further, instruction concerning ore and coal deposits, science of mining, and enriching, and in everything pertaining to mining mechanics, such as the construction of water-works, hammer-mills, rolling-mills, blast-apparatus, hoisting-engines, etc. The course lasts nearly 1 1/2 year, and instruction is free. Concerning the requirements for admission etc., as well as preparatory instruction, see under the Technical High School, page 344. The number of pupils in 1903 amounted to 16, besides 51 pupils in prepatory courses at the Technical High School. The Mining school enjoys an annual State grant of about 23,000 kronor, and a sum of 15,000 kronor a year from the Iron Institute for the practical instruction of pupils in the iron industry and mining, at works and mines.

The **Lower Mining schools** are situated in Falun and Filipstad. The *Falun* School was established upon the removal of the former higher school to Stockholm (see above); the *Filipstad* School was established in 1830. Both these schools have for their object the training of foremen mine-captains, a. o. The subjects of instruction are the same as at the Mining school in Stockholm, but admission is easier and the courses are smaller. The schools are supported by a State grant and by contributions from the Iron Institute.

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X.

MANUFACTURING INDUSTRIES.

In the introductory survey of branches of trade given above, an account is included of those general conditions that have exercised a beneficial or deleterious influence on the development of manufacturing industries in Sweden. Before proceeding to sketch the present state of Swedish industrial enterprise, we propose to give a few brief data regarding its history.

In the Middle Ages and for some considerable time later, the *industry* of the country may be said to have been exclusively domestic in character; hence, the review given below of the history of handicrafts embraces at the same time the story of the first beginnings of industry in the country in past times. Only in the **sixteenth century** greater industry, in the modern sense of the word, is to be traced in Sweden; here, as in almost all other fields, the leaders and promoters were the two Kings Gustavus Vasa and Charles IX. *Gustavus Vasa* (1523/60) was the great regenerator, first and foremost by re-establishing the independence of Sweden and by securing for her a firm political organization; at the same time he was himself as a farmer, as well as a manufacturer and a man of business the greatest employer in his kingdom. Sweden had already at that date attained a rather high position in shipbuilding and in the manufacture of arms, while mining, too, was already a very important factor in the economic life of the country. *Charles IX* (1599/1611) did great service to industry in his time, more especially in connection with mining in Vermland. In the compass of his duchy, many factories were set up, such as for cloths, arms, and glass; there, too, a very considerable manufacture of tar was carried on, an article which at that time and for long afterwards formed one of the chief exports from Sweden.

The industrial history of the **seventeenth century** is also closely and primarily bound up with the names of the great statesmen of the time, viz. the two Kings Gustavus Adolphus and Charles XI, and the famous Chancellor of the former, Axel Oxenstierna. The name of one private individual, however, must not be forgotten: Louis De Geer. The contributions of *Gustavus Adolphus* and *Axel Oxenstierna* to the industrial life of their age were chiefly in the fields of trade and navigation, but they also made great efforts to stimulate and promote manufactures. In this department, by far most had to be created afresh. Skilled workmen were called in from abroad to instruct the Swedish artisans, who as a class have never forgotten what they then acquired; and, to remedy the lack of capital in the country, competent and wealthy business men were

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induced by various means to settle in Sweden and invest money in industrial enterprises. The most eminent of these foreigners was *Louis De Geer* (1587/1652), a Dutchman; after having already embarked largely in business on Sweden at an early period of his life, he settled in the country in 1627. As a naturalized Swedish subject, he served his new country well and faithfully, while, in return, it threw open to him its manifold natural resources, granting him very extensive privileges and thereby rendering his opportunities and consequent gains greater. All circumstances afford evidence of a remarkable policy, pursued with great consistency by Gustavus Adolphus and Oxenstierna, of searching out men of the greatest capacity in every domain and endeavouring to acquire them for the benefit of Sweden, a broad and enlightened patriotism that has had the most beneficent results. Louis De Geer did a great deal at Dannemora, but, above all, he transformed Finspång into the chief seat of manufacturing industry in Sweden, erecting blast-furnaces, tilt-hammers, and factories there, improving the forges on the French or Walloon pattern, and putting up gun-foundries, etc. Norrköping became the port from which were shipped the products of this increased activity and it grew so rapidly as to rank from that time with the chief towns of Sweden. In Norrköping itself, industrial establishments were founded, rifle-factories and brass-works; the manufacture of cloth, that has since been a noted production of the town, dates its origin from that period. (The first cloth-factory in Sweden of any importance had been established at Jönköping about 1616). The linen industry and leather manufacture attained a considerable development; breweries were started on the model of those in Germany and England, and also paper-works; the production of arms went on increasingly; the famous copper-mine in Falun attained at this time its maximum output, while the Eskilstuna-ware, in our days so renowned, began to be manufactured in the reign of Charles X Gustavus (1654/60).

Charles XI (1660/97), whose energies extended over a very wide field, paid attention to industry, too. Cloth-manufacture in particular developed with rapid strides, largely owing to the King's orders that the uniforms now introduced into the army should be exclusively made of home-manufactured material. The production of arms was further developed, and in that branch scarcely any other country could vie with Sweden at the time; great quantities were manufactured, not only in the larger factories but also by artisans and in the homes. Swedish ship-building, an ancient industry, made important progress and, at Söderfors, an anchor-forge was erected, which soon became famous throughout Europe.

To sum up, then, Swedish industry of the seventeenth century was by no means insignificant. It may be said, however, to have been confined to a few branches only, of which still fewer could boast of having reached a stage where their products found a market abroad. A very large proportion of manufactured articles had still to be imported, and the production of raw material was beyond question the main source of livelihood for Swedes of that period. It was the chief object of the **eighteenth century** to extend manufacturing industry to all departments and to increase the export trade; changed political conditions caused the part of promoter to pass over to the representatives of the people in the *Riksdag* and to *private individuals*. Among the latter, the foremost place now belongs to a Swede, *Jonas Alströmer*. That remarkable man was born at Alingsås in 1685. He began his career as a merchant in London. It was not long, however, before he conceived it to be his life's work to make his native land a participant in the flourishing industry that formed the basis of the wealth of England; to accomplish this end, Alströmer laboured incessantly during the remainder of his life, displaying those qualities of fortitude of purpose, unselfishness, and unpretentiousness, that are often to be met with in our people when a man has found an object in life to which to devote his whole energy.

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Alströmer began to carry out his project by sending over from England to Sweden workmen and machinery for the weaving of woolen and cotton goods, but he soon determined to move to Sweden himself. In Alingsås, he put up all kinds of factories for textile goods, and under his guiding hand Alingsås became the chief seat of that species of industry; moreover, engineers, artisans, and foremen came in large numbers to study the methods in use there. One of the leading principles that Alströmer held to, was, as far as possible, to make use of Swedish raw materials. This caused him to turn his attention to almost all the sources of livelihood of Swedes of that day; he was specially active in furthering a more rational breed of domestic animals. He was, moreover, a highly enlightened man, and took a keen interest in scientific research. He was instrumental in the foundation of the Academy of Sciences, and established a library, a natural history museum, and a collection of models at Alingsås.

The new movement was received with great enthusiasm by the Government and the Riksdag, and every encouragement was offered to it. Special rights and privileges were accorded to Alströmer and other industrialists; numbers of branches of industry up to that period unpractised in Sweden were set on foot, and everything was done, also, to stimulate the export of Swedish-made goods.

Jonas Alströmer.
Born 1685. Died 1761.

That much of the youthful enthusiasm which had had so promising a success in the beginning, died away unproductively, by reason of the natural obstacles that further experience brought to light, is well known. The keen mercantile ideas followed out in Sweden with the utmost consistency, gave rise to many industrial enterprises not adapted to the conditions of the country; it was subsequently found that these were doomed to failure from their very inception, but the inevitable stagnation thereby entailed had very far reaching effects on the industrial life of the period. It may be said, however, about the descriptions usually given of the state of things existing in Sweden at the close of the period known as the »Era of Liberty», that they are palpably overdrawn in many particulars, being based largely upon contemporary notices that are not free from party bias and certainly lack adequate authoritativeness. We possess another critique upon the times in the population statistics, then established. As far as can be judged from that source, the decade 1751/60 was perhaps the most prosperous period that Sweden ever enjoyed, in economic regard; and though towards the close of the next decade conditions became considerably worse, yet the reign of Gustavus III (1771/92) will not bear comparison at all with the »Era of Liberty» (1719/72). With reference, in particular, to the activities of Alströmer himself, it is true, certainly, that many of the factories he established had subsequently to be closed, and that the machinery often found its way back to foreign countries, where it was sold at prices not comparable with the original cost, but one element of his work was *not* lost, viz., the

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The statue of John Ericsson, in Stockholm.

industrial *education* which he imparted to this countrymen, for to that is in great measure owing the economic progress that has come about in later times.

The reign of *Gustavus III* (1771/92) was of import for Swedish industry up to a certain point, in so far that a more liberally-minded legislation contributed its quota towards placing industrial enterprises on a sounder basis. The credit of this improvement belongs principally to the great financier *J. Liljencrantz* (1730/1815). Generally speaking, however, the condition of things from an economic point of view was distinctly unfavourable during the greater part of the reign of Gustavus III.

With the dawn of the **nineteenth century** came the vast revolution in the industrial world entailed by the discovery of steam as a motive power. Sweden appropriated the epoch-making discovery very early, a circumstance due to the efforts of *A. N. Edelcrantz* (1754/1821), a very versatile official, scientist, and literary man. He went to England in 1804, returning with four steam-engines of the best construction, on Watt's system. To set up these engines he procured the services of an English engineer, *Samuel Owen* (1774/1854), a man who earned the gratitude of Sweden for work in many departments. The mechanical workshops that Owen established (1809) at Kungsholmen, Stockholm, mark the first beginning of machine industry in Sweden. That series of eminent foreigners who have worked as pioneers to promote the industries of Sweden is headed by De Geer and closed by Owen. It was Owen's doing that Sweden came second only to England among the nations in applying steam-power in the service of navigation. Owen was, furthermore, very active in the causes of temperance and religious revival.

From that time forward, the history of Swedish industry becomes one of the several special branches into which activity in this direction resolved itself; many of the more important features of each will be briefly touched upon in the following paragraphs. The most important events in the general history of legislation on the subject during the nineteenth century are: the emancipation of industry from antiquated restraints in the years 1846 and 1864, the French commercial treaty of 1865 introducing the system of free trade, and the subsequent return to a modified system of protective duties in the years 1888 and 1892; in the history of the special branches during the same time, the rise of the sawmill industry occupies the foremost place. Swedish industry still suffers very materially from the difficulties concomitant with the absence of fossil fuel and with the failing market for many of our manufactured wares; these circumstances have already been discussed above.

The number of people taking their livelihood from industry in 1870 was estimated at 613,000, i. e., 14·7 % of the whole population; the number in 1900 had risen to 1,484,000, or 28·9 % of the whole population; the above figures embrace all species of industry and handicrafts as also mining.

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The development of Swedish industry during the **last few decades** may be roughly given by actual figures, though those for the earlier periods are not very reliable. It is not, indeed, until 1896 that the statistics on this point can be fully relied on. Restricting ourselves to those *branches* for which figures are available for some decades back, we may display the development during 1861/97 by means of the following Table[1]:

Average	No. of Factories.	No. of Workmen.	Value of Manufactures.
1861/65	2,465	30,016	71,693,000 kronor.
1866/70	2,235	31,601	82,966,000 »
1871/75	2,516	52,207	143,912,000 »
1876/80	2,827	57,423	154,587,000 »
1881/85	2,916	68,627	185,643,000 »
1886/90	3,174	84,482	219,960,000 »
1891/95	4,165	117,207	316,100,000 »
In 1897	5,297	161,453	466,800,000 »

Even if the advance shown by the figures above to some extent should be owing to a greater completeness of returns in later years, yet the numbers point indisputably to a very marked progress during that period. Especially distinct is the rapid development subsequent to 1889.

In 1896/1900, during which years the figures of the manufacturing statistics are fully comparable with each other, the development has been as follows:

Years.	No. of Factories.	No. of Workmen.	Value af Manufactures.
1896	8,812	202,293	692,401,000 kronor.
1897	8,974	220,202	783,504,000 »
1898	10,029	245,720	887,750,000 »
1899	10,364	257,526	949,635,000 »
1900	10,549	265,479	1,046,196,000 »

Another method of displaying the advances made by industry is afforded by the figures which follow, giving the **consumption of coal and coke** (in metric tons à 2,204 *lbs.*):

Average	Production in Tons.	Import in Tons.]	Consumption in Tons.	Do. per Inhab. in Kilogr.[2]
1861/65	31,000	335,000	366,000	92
1866/70	40,000	378,000	418,000	100
1871/75	50,000	595,000	645,000	151
1876/80	93,000	782,000	875,000	194
1881/85	151,000	1,042,000	1,193,000	259
1886/90	177,000	1,322,000	1,499,000	316
1891/95	203,000	1,759,000	1,962,000	406
1896/00	236,000	2,614,000	2,850,000	566
In 1900	252,000	3,129,000	3,381,000	661

Thus, in little more than thirty years the consumption of coal and coke has gone up from 370,000 tons annually to nearly 3,400,000, or from less than 100 kilogr. to more than 660 kg. per inhabitant. The increase during the last few years has been extraordinarily great.

[1] A krona = 1·10 shilling or 0·268 dollar. — [2] A kilogram = 2·204 *lbs.*

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The consumption of coal for Europe as a whole is at present about 1,200 kilogr. per inhabitant annually. The lowness of the figure given above for Sweden s accounted for by the fact that other fuel is used to so large an extent in comparison with other countries. For the Swedish iron production charcoal is almost exclusively used as fuel, while wood is used for many purposes where other countries have coal. Furthermore, the large number of cases where water-power is made use of in industry are in a measure another explanation of the relatively small consumption of coal in Sweden.

A complete survey of the present state of the manufacture of Sweden may be obtained by consulting the factory statistics as it has been carried out in later years. Including also dairy-farming, and forest and mining industries, which have been dealt with separately above, the total number of industrial concerns and of hands employed at them, together with the value of the manufactured articles — handicrafts and domestic trades excluded — amounted to the following in 1900:[1]

Branch of Industry.	No. of Factories.[2]	No. of Workmen.	Value of output. Kronor.
Articles for Nutriment and Indulgence	5,043	35,570	387,249,000
Textile and Clothing industry	802	37,187	134,734,000
Hides, Skins, and Hair	623	6,873	26,166,000
Oils, Tar, India rubber, etc.	187	2,434	21,105,000
Timber and Timber-ware industry	1,713	68,452	231,747,000
Paper industry	159	8,490	30,340,000
Manuf. from various Vegetable Substances	37	676	1,898,000
Manuf. of Stone, Clay, Charcoal, and Peat	1,555	44,974	69,417,000
Chemical industry	256	2,644	15,285,000
Mining	438	13,861	20,273,000
Ironworks[3] and Blast-Furnaces	246	16,876	183,053,000
Metal- and Machine industry	1,441	56,222	167,353,000
Other branches	421	7,757	17,900,000
Total	12,921	322,016	1,306,520,000

In respect to the value of output, it should be noticed that products subjected to several processes of refinement are put down at their full value in each case. This naturally renders the total amount considerably too high; it is, however, at present, impossible to rectify this.

A corresponding calculation for 1897 (not quite so complete) gives a total value of output of 983 million kronor, i. e., 196 kronor, on an average, for every inhabitant in the country. It may be seen from Table 114 and the map on page 771 how this relation between value of output of manufactures and population varies in different parts of the kingdom. The foremost place is occupied by Malmöhus Län, with 356 kronor per inhab., while Jemtland comes last with only 41 kronor. — Table 114 shows, too, which branches of manufacturing industry have attained the widest scope in Sweden.

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[1] The figures given in this Table are considerably more comprehensive than those on page 767 and cannot, therefore, be compared with them. — [2] Factories that turn out articles in more than one of the branches here enumerated are included in both or all places; hence, the total number of factories is somewhat too high. — [3] Including also other metals.

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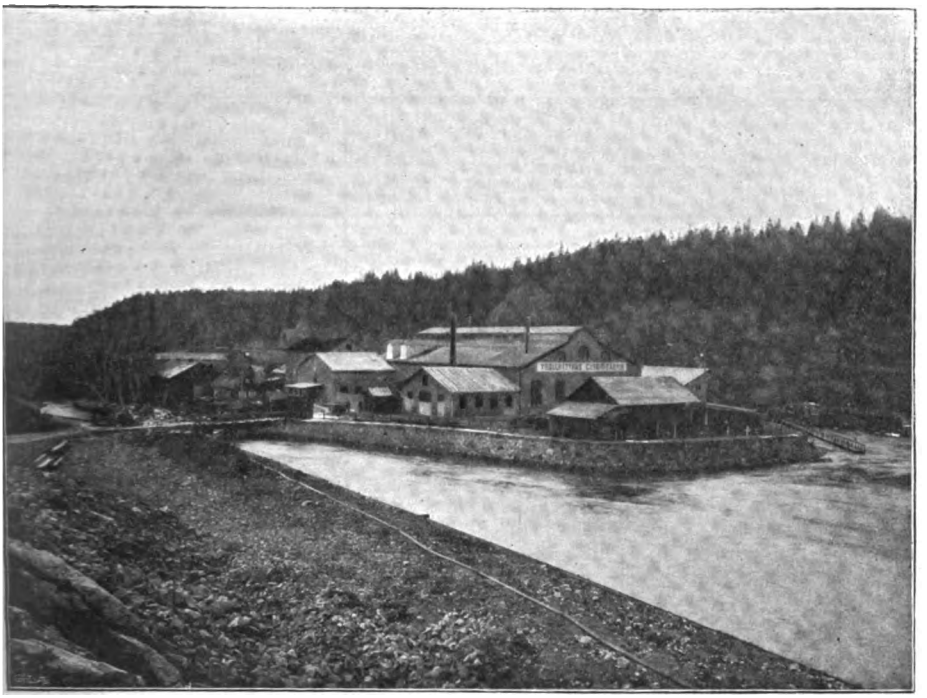

Factory at the Trollhättan Falls.

Sweden may be divided into **three industrial spheres.** The *Southern* section of the country, extending northwards to about the latitude of the north shores of the large lakes, is chiefly devoted to agriculture; in addition, however, a very considerable industry is carried on in branches allied to agriculture, and in others also. In *Central* Sweden, beside agriculture, mining and allied manufactures form a very important source of livelihood for the people. In *Northern* Sweden, lastly, agriculture is to some extent put into the shade by the timber industry, and in the far north, by mining.

The characteristics that may be especially ascribed to Swedish industry are the employment of the very best materials — in some cases almost unnecessarily superior in quality — and, moreover, honest and careful workmanship. This last-mentioned characteristic of Swedish manufactures is due, in great measure, to the personal interest that Swedish artisans very frequently take in the work they have in hand, and their pronounced objection towards letting anything come out of their hands that is not perfected to the best of their ability. On the other hand, it may be said that the mechanical skill in routine production possessed by the Swedish workmen is not always as great as might be wished; that, again, is due to the fact that production is often necessarily carried on on a small scale, precluding a thoroughly satisfactory distribution of

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TABLE 114. *The scope of industry in the various Läns in 1897.*[1] *The more important industries in 1900.*

Läns.	Factories.	Workmen.	Value of manufactures. Mill. kr	D:o per inhab. Kronor.
Stockholm city	629	23,685	99·73	346
Stockholm prov.	339	8,142	33·96	211
Södermanland	313	5,827	23·09	186
Uppsala	591	8,229	24·76	150
Östergötland	835	17,456	68·13	248
Jönköping	531	9,447	21·65	109
Kronoberg	311	4,570	7·75	49
Kalmar	490	7,013	19·13	84
Gotland	70	878	3·38	65
Blekinge	284	6,543	18·00	124
Kristianstad[7]	441	4,528	38·60	176
Malmöhus	1,017	26,118	139·96	356
Halland	239	4,690	13·50	96
Göteborg o. Bohus	609	23,416	81·79	254
Elfsborg	537	13,640	42·57	154
Skaraborg	724	7,200	19·52	80
Vermland	567	11,815	43·18	170
Örebro	639	11,207	43·03	224
Vestmanland	494	8,509	35·08	243
Kopparberg	515	12,299	56·08	266
Gefleborg	567	14,076	65·20	288
Vesternorrland	320	14,012	52·99	237
Jemtland	145	1,771	4·41	41
Vesterbotten	142	3,837	14·40	104
Norrbotten	177	5,623	13·03	107
Total, in 1897	**11,526**	**254,531**	**982·87**	**196**

Greater industries, in total for the whole kingdom, in 1900.	Value. Million kronor.
Saw-mills	163·48
Flour-mills	83·58
Bar iron works[2]	65·34
Iron works[3]	64·92
Iron and steel factories[4]	60·77
Cloth factories	57·87
Dairies	57·00
Mechanical works	53·03
Blast furnaces	47·95
Sugar refineries	47·51
Spinning mills	45·93
Breweries	33·64
Wood-pulp mills	33·17
Beet-sugar factories	31·97
Spirit factories[5]	31·72
Spirit distilleries[5]	29·41
Paper mills[6]	24·23
Joineries	20·04
Ore-mines	17·54
Tobacco-factories	15·71
Other	321·71
Total, in 1900	**1,306·52**

Note. The branches of industry here specially specified include such as exceed 15 million kronor in value of output. On the methods of valuation see the text, page 768, and note 5 below.

special processes exclusively to the charge of specially expert hands. The result of these circumstances is that the products of Swedish industry are, as a rule, of excellent quality, but not infrequently so dear to the purchaser that it is difficult for them to compete with goods imported from countries where manufactures can be carried on on so much vaster a scale. A contributory cause to the expensiveness of Swedish manufactured goods is also the fact, to which attention has latterly been called, that the Swedish workman not seldom lacks desirable intensity in his labour.

The facts enumerated above will be enough to account for only few of the branches of Swedish industry having succeeded in establishing an export trade on a larger scale. To remedy this drawback is the imme-

[1] The figures given in this respect are based on an investigation made by K. KEY-ÅBERG, published in the Ekonomisk Tidskrift, 1899. A krona = 1·10 shilling or 0·268 dollar. — [2] Forges and rolling-mills. — [3] Ironworks for the manufacture of unwelded intermediate goods. — [4] Manufactories for steel and iron goods and foundries. — [5] It should be mentioned that in calculating values, the increase due to the excises on manufactures is included: otherwise the actual value of output from the spirit factories and distilleries would only amount to a fraction of the above figure. — [6] Including pasteboard factories.

[7] The value of manufactures for the Län of Kristianstad has increased disproportionately, owing to the mode here adopted of estimating the value of the spirit production; cf. note 5 above.

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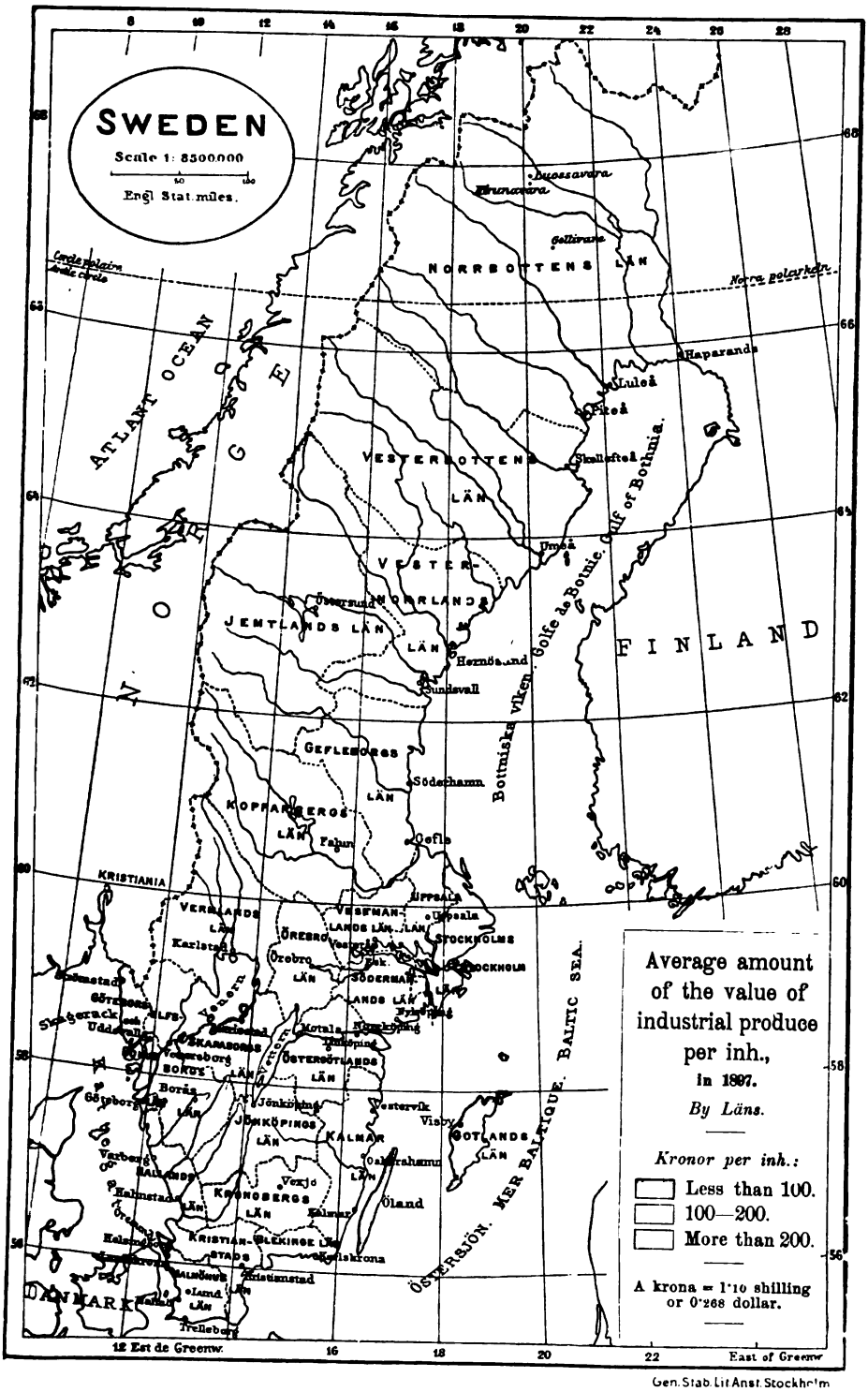

Gen. Stab. Lit. Anst. Stockholm

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TABLE 115. *Manufacturing industry in Sweden. Towns and rural districts, in 1900.*[1]

Towns.	Factories.	Workmen.	Value in thousands of kronor.	Towns.	Factories.	Workmen.	Value in thousands of kronor.
Stockholm	666	27,128	127,319	Kalmar	37	760	8,723
Malmö	288	8,617	49,998	Karlskrona	40	2,270	7,193
Gothenburg	251	9,598	49,401	Södertelge	32	1,655	6,487
Norrköping	175	8,549	36,289	Halmstad	59	1,478	6,203
Helsingborg	99	2,856	22,223	Uppsala	62	1,148	5,925
Gefle	113	3,451	16,519	Nyköping	43	952	5,367
Borås	82	3,828	15,915	Karlstad	44	1,380	5,250
Landskrona	65	1,609	13,600	Other towns	1,235	21,144	72,092
Kristianstad	41	1,080	13,364				
Jönköping	75	4,010	11,837	Towns	3,645	107,628	503,600
Ystad	42	880	11,337	Rural distr.	6,904	157,851	542,596
Lund	64	1,631	9,539				
Eskilstuna[2]	132	3,604	9,019	Total	10,549	265,479	1,046,196

diate task set before industrial enterprise in the country at the present time, if it is to attain those dimensions which alone can render it of the economic importance desirable for the country as a whole; as has been pointed out several times in the foregoing pages, the prospects of a realization of these hopes seem brighter at present than in the past.

This fact depends upon the expectations entertained with reference to the **waterfalls,** of which Sweden can boast so rich a supply.

Sweden has at its command a more plentiful supply of water-power than any other European country. The knowledge of the power in our waterfalls is, however, as yet surprisingly incomplete; estimates as to the force available vary from 2 to 9 million horsepower. The most reliable calculations would seem to warrant the assumption that 4 millions is about the correct figure. What this implies will be evident, when it is remembered that our entire manufacturing and mineral industry nowadays has at its disposal only about 400,000 horse-power and that one horse power is reckoned as representing a *capital* of more than 50 pound sterling, when put to profitable use.

The utilization, however, of these vast sources of power can only be effected with the aid of considerable capital, and it may be assumed that in some cases the obstacles in the way of turning the fall of water to account will prove so great as to preclude the realization of it at all for a moderate outlay. On the other hand, the supply of power to be drawn upon will be found in many places to admit of development and — what is of especial importance — of being made more *uniform* by the mere dredging and regulating of the watercourses. This kind of work, it may be expected, will be taken in hand on a large scale as soon as the question of taking advantage of the latent wealth in Swedish waterfalls is seriously before the public.

[1] The table embraces the industries included in the official Factory Statistics, and is consequently not comparable with the Tables on p. 768 and 770, nor with the Tables on p. 767. It should be noted that in many instances a considerable manufacturing business is carried on in the immediate vicinity of towns, as at Gothenburg, Eskilstuna, Sundsvall, etc.; this industry is of course here placed with the rural districts. A krona = 1·10 shilling or 0·268 dollar. — [2] A great part of the celebrated Eskilstuna iron and steel industry is referred to the surrounding country districts, and is consequently not included here.

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The Falls of Stora Sjöfallet in the Lule River.

In places where water-power can be turned to account in immediate vicinity to its source, it is as a rule a more economical motor than steam. Hence, even in the »Age of Steam», a large number of mills driven by water have been established in our country, while others already in existence are still kept in work; at present, it may be said that water and steam play approximately equal parts in the industrial enterprise of Sweden as a whole.

The immediate vicinity of a waterfall, however, often presents an unfavourable field for the erection of mechanical works, by reason of the absence of raw materials in the district, of the great distance from a market for the disposal of the finished articles, or from a variety of other causes. The grand discovery of our times in this regard is, as well known, that water-power transformed into *electric* energy, admits of being *conveyed* for considerable distances — up to some tens of kilometers and more. It would be a further step in the desired direction, if it were found that this energy could be *stored* in a satisfactory manner, in transportable accumulators or by other means. Thus, the hope is perhaps justified that, within a short time, it may prove possible to utilize the latent energy in the Swedish waterfalls to a much greater extent than has hitherto been the case. If the very large figure given above as representing the force and value of Swedish waterfalls be remembered, it will be easily seen that the chances of the country becoming in course of time a vast industrial center are by no means few or remote.

An essential prelude to the realizing of the above-mentioned hopes in connection with the waterfalls, is the regulating in a stable manner of the questions as to the *possessorship* of these sources of latent power and wealth. As the case till now has been, the uncertainties as to ownership have in most cases necessitated

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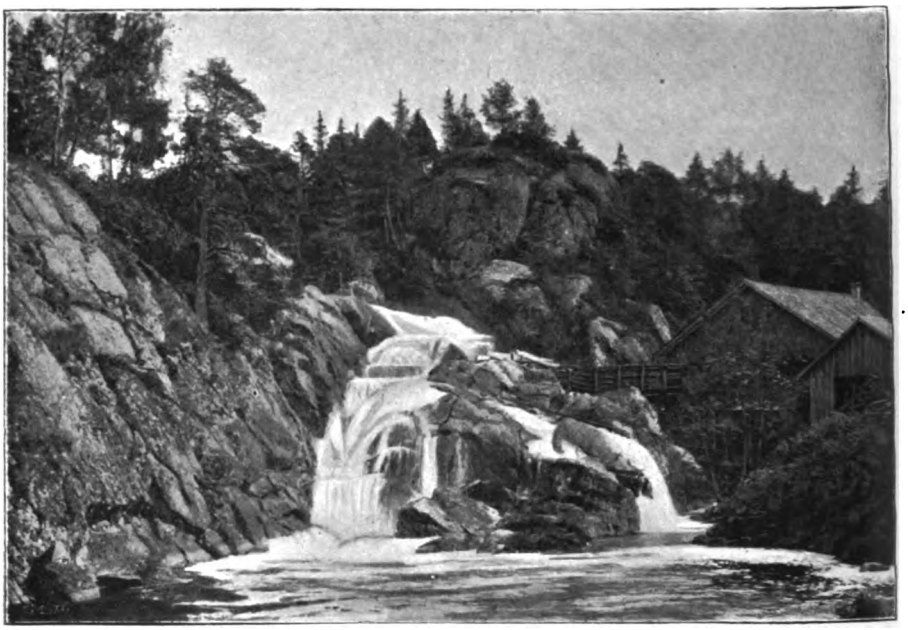
wearisome and continual litigation. Frequently, the very utilization of the water has been rendered impossible by the vague stipulations regarding it. Far-reaching claims have been advanced by the State for the rights of ownership of a large number of falls.

Concerning the *utilization* of the water falls — with regard to transformation in electric power and transmission — a legislation of modern type is very recently gained by the law of June 27, 1902. For further details see under the heading of Electric Industry in the following.



Huskvarna Falls, near Jönköping.

For the **administrative** business connected with the mining and manufacturing industries, commerce and navigation in Sweden, there exists a central department, the **Board of Trade** (Kommerskollegium), with three subdivisions, one of which is concerned with the mining and manufacturing interests. The State contributes, furthermore, towards promoting the advance of industry by supporting fully modern *schools*, — not only general technical schools (an account of which will be found above, on page 342), but also, in certain cases, special professional institutions — the latter being, however, for the most part of a private character —, accounts of which are given in their respective places below. The State also makes grants in support of *exhibitions*, and provides *stipends* for both foremen and workmen to travel for the purpose of improvement in their several branches. An account of existing enactments to *protect* workmen from dangers concomitant with their employments, will be found at the close of the present work.

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With regard to the industrial activity in the country, annual Tables of **statistics** have been for many years published by the Board of Trade. These statistics were early drawn up in such a way as to afford much more information than those published by other countries. The results, however, long fell short of the intention, by reason of the incompleteness and unreliability in the figures given; it is not until after the date when a special statistical department of the Board of Trade was established, with an adequate staff of clerks, that the results arrived at and published can be received as trustworthy. The drawing up of the Tables has been much facilitated by the Law of November 13, 1896, whereby it is made *obligatory* upon industrial concerns to hand in prescribed statistics. It is beyond doubt that the figures *now* published for Swedish manufactories and handicrafts are more complete and more trustworthy than those of any other country. As a matter of fact, Sweden is the only country that *every year* publishes statistics of manufactories, embracing all the various industries.

In dealing below with the several branches of industry, the same **subdivision** is adopted as in the official statistics; objections of a minor character to this might be brought forward, but it has the great merit of being the same as has been in use for our trade statistics during three decades, a circumstance that renders comparison between the figures for production and those for imports and exports very much simpler.

1. ARTICLES FOR NUTRIMENT OR INDULGENCE.

This large group, including, on the basis of value, 30 % of the industrial produce of Sweden, may be subdivided — in accordance with the character of the raw materials employed in production, or with that of the product in question — as here follows, with figures for 1900, into:

	Factories.	Workmen.	Value of production.[1]
Products from Grain and Roots	1,934	6,596	105,844,000 kronor.
Dairy produce	1,688	5,800	57,000,000 »
Other Food-stuffs from the Animal Kingdom	102	1,409	18,832,000 »
Sugar, Chocolate, Tobacco, etc.	226	13,025	103,141,000 »
Drinkables, etc.	1,093	8,740	102,432,000 »
Total	**5,043**	**35,570**	**387,249,000** kronor.

A survey of the **imports and exports** of articles belonging to this group is given in Table 116, on the following page. As seen from the same, our country has long had to import food-stuffs in considerably greater quantities than it is capable to export. The deficit amounted in 1896/1900 to a value of 64 million kronor on an average, and reached

[1] A krona = 1·10 shilling or 0·268 dollar.

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TABLE 116. *Imports and exports of articles of consumption, as Food or Stimulant.* (A krona = 1·10 shilling or 0·268 dollar.)

Average for the years	*Imports.* Value in thousands of kronor.				*Exports.* Value in thousands of kronor.			
	Produce of Agriculture and Fishing.	Colonial Commodities.	Other Commodities.[1]	Total.	Produce of Agriculture and Fishing.	Colonial Commodities.	Other Commodities.[1]	Total.
1871/75	36,876	37,101	10,950	**84,927**	43,759	72	492	**44,323**
1876/80	55,593	44,076	8,939	**108,608**	48,846	97	1,143	**50,086**
1881/85.....	62,436	40,604	13,110	**116,150**	47,803	177	2,274	**50,254**
1886/90	46,036	50,115	12,151	**108,302**	58,879	691	3,437	**63,007**
1891/95.....	50,304	47,688	12,071	**110,063**	74,480	1,136	1,203	**76,819**
1896/00.....	61,224	40,952	17,073	**119,249**	53,362	301	1,375	**55,038**
In 1897....	48,138	41,607	13,287	**103,032**	52,893	221	1,040	**54,154**
» 1898....	60,768	37,083	17,628	**115,479**	55,321	159	1,793	**57,273**
» 1899....	71,691	38,635	21,992	**132,318**	51,621	135	1,170	**52,926**
» 1900....	79,720	45,584	20,564	**145,868**	43,894	336	2,145	**46,375**

in 1900 to nearly 100 millions, on account of failure of the crops in 1899. In general, the deficit is caused especially by the *colonial commodities;* exclusive of these, the exports have been preponderant for the years 1886/95, but not in recent times, and the prospects at least for the immediate future are not altogether favourable.

Flour-Mills.

In all parts of the country there are to be found mills, often very small in size, where the farmers of the neighbourhood get their grain ground. In a large number of cases, such mills are worked by the aid of a *waterfall*, the supply of that motive force being a very abundant one. Only in a few of the Swedish provinces, such as Skåne and Vestergötland, which are characterized by extensive plains, are water-mills replaced by *wind-mills*, by reason of the absence of water-power. Thanks to improvements introduced in the construction of both water-mills and wind-mills, these have of recent years been placed in a position to utilize more effectively these forces of nature, yet this has not prevented that other motive force, steam, from making inroads and, in part at any rate, from transforming the milling industry; a **steam mill** can be erected almost anywhere, thus for instance at a seaport town in direct connection with commerce in flour. Many farmers who in former days had their own grain ground at the nearest mill, now find it profitable to sell their grain and buy the flour they require. The large mercantile mills naturally seek to turn out a flour that shall be as excellent and uniform in quality as possible; that, of course, primarily depends on the quality of the grain. These trading mills, therefore, are instrumental in improving the quality

[1] Fruit and garden-plants, etc.; also drinkables.

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of the grain produced in the country and in effecting a thorough *sorting* of the yield of grain from different districts, this being rendered obligatory by the difficulty of disposing of flour of varying quality.

Rye-flour is used a good deal in Sweden, especially in the country districts; the farmers, however, each get the amount they require for private use ground at a neighbouring mill.

In the Factory Statistics for 1900, the number of large mills registered was 1,445, provided with a total of 1,238 pairs of rollers and 4,949 pairs of stones; the number of workmen employed was 4,259. The total production amounted to 3,681,287 quintals of flour, and 1,304,767 quintals of groats, grits, and bran (a quintal = 1·97 cwts.), with a total value of 83·58 million kronor. Of the more important mills may be mentioned: *Svanberg & Co.*, *Wennberg & Ramstedt*, the *Saltsjökvarn* (kvarn sign. mill), and the mill *Tre Kronor*, all in or near Stockholm; further, *Uppsala Ångkvarn* (i. e. steam flour mill), the great cylinder mills at *Malmö* and *Gothenburg*, etc.

As is shown in Tables 70 and 71 (page 532), the *import* of flour during recent years has decreased. For the decade 1881/90 the annual import works out at 505,000 quintals of rye and wheat flour, but during the latter half of the succeeding decade at only 150,000 quintals. As the import of unground corn has not decreased and the yield of the home harvests has increased, it is evident that the milling industry must have made considerable advance; when it is remembered, too, that, as above stated, the large mills that are worked on better and more business-like lines, are continually driving the old-fashioned small mills out of the field of competition, it will be seen that the output of flour at the former must be even larger still. Actual figures, however, as to this increase cannot be given, as statistics of the milling industry were not collected until the year 1896.

Starch Factories.

The manufacture of **potato-flour** has probably been carried on almost ever since potatoes were known; it was a home industry at the majority of farms. Since the production of spirits decreased in consequence of the temperance movement, a certain, although but a small percentage (about 2 %) of the annual potato-crop has been applied to the manufacture of starch in special **starch-factories.** The chief districts for these factories are the Läns of Kronoberg, Blekinge, and Kristianstad. At most of them potatoes form the raw material used. The length of the season is dependent upon the quantity of the potato-crop; it usually embraces the period from October to February inclusive.

Potato starch is turned out in three qualities: best firsts, best seconds, and thirds (Grårnjöl). The first-named is about 90 % of the whole output. Potato-starch is used as an ingredient in German yeast (about 1¼ millon kilogr. in 1902), in the production of dextrine, liquid and dextrine glucose, in the preparation of pearl-sago, as a stiffening material in cotton weaving, and, perhaps in the largest quantity of all, in the preparation of food for household consumption. The poorer qualities are used as a makeweight in soft soap, and in some districts as an additional mash in the distillation of potato-spirit. — In some factories rice is employed as the raw material, and *rice-starch* is used both in washing and, in refined qualities, as macaroni, pearl-sago, dextrine, and liquid glucose. Rice-starch factories are to be found chiefly in Stockholm and Gothenburg.

The number of starch-factories in Sweden in 1900 was 95, employing 533 workmen; the turnout was 75,807 quintals (à 1·97 cwts.), being sufficient to cover

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the total demand of the country both for starch and for the refined products thereof. In years with an average potato-crop, the weight of potatoes employed in the manufacture of potato-flour, etc., is between 200,000 and 300,000 quintals. The *refuse matter* from the manufacture is used as cattle-fodder.

Liquid glucose (starch-syrup) is prepared from starch by heating it together with diluted sulphuric acid. Liquid glucose is used in large quantities in the production of pressed fruit-conserves, owing to its retaining a gelatinous consistency and not crystallizing. By **sago** is meant strictly the starch obtained from the stems of the sago-palm and other allied varieties of the palm or of arrow-root, but an imitation sago is nowadays prepared in large quantities from ordinary starch.

Macaroni is prepared from wheat flour of a very glutinous quality by stirring it thoroughly with a small quantity of warm water; the semi-solidified mass so obtained is then pressed into moulds or through orifices of suitable shape; hence are obtained hollow tubes, ribbons, vermicelli, peas, etc.

Starch, liquid glucose, pearl sago, and dextrine are usually manufactured in one and the same factory, macaroni, on the other hand, at special factories.

Margarine Factories.

The raw material out of which margarine was originally made was *tallow*, it being tried at a low temperature to form what is termed »premier juice». This is subsequently made to solidify to some extent, whereupon a fluid portion, *oleo-margarine*, subjected to pressure and mixed with milk or cream, is churned till it assumes the consistency and appearance of butter. For reasons of economy, other articles are at times substituted for oleo-margarine, such as *oil of lard*, chiefly from America, and *vegetable oils*, such as gingitic, cotton, and palm oil.

The manufacture of margarine was first started in France in 1869 by Mège-Mouriés. In Europe, Holland is now the country where most is manufactured, while England is the country where most is consumed. The first factory in Sweden was built in 1881 in Helsingborg. In 1900, there existed 6 factories, the largest, in Gothenburg, turning out 43 % of the whole production, that year amounting to 105,345 quintals. As there was an import the same year of 3,400 quintals and an export of 120, the actual *consumption* amounted to 108,625 quintals, or 2·12 kilogr. per inhabitant. There is at present a distinct increase to be observed in the consumption of this article. For the sake of comparison, it may be noted that the consumption of natural butter is about 5 1/2 kilograms per inhabitant.

The manufacture of margarine in Sweden, in virtue of a Law of July 12, 1898, is now superintended in every factory by a Comptroller, specially appointed by the governor of the Län. On the other hand, there is no security as to the *imported* margarine having been subjected to control in manufacture.

The sale of margarine was also by the same law rendered liable to certain restrictions, with a view to preventing any chance of its being mistaken for natural butter. The *price* of margarine varies according to its quality, but it may be stated as a general thing that it is sold at 1/2 or 3/4 of butter prices. — By far the greatest import is from Norway; many of the Norwegian factories have latterly put up branch establishments in Sweden.

It may be noted in this place that in 1900 there existed in Sweden 9 **tallow refineries** and 1 **oleo-margarine factory,** their united output amounting in value to 588,000 kronor.

Of late years there have also been established several factories for the production of **margarine cheese,** which is prepared of an emulsion of separated milk and oleo-margarine or substitutes for it. According to law, margarine cheese shall on the outside be coloured red.

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The Manufacture of Beet-Sugar.

As far back as between 1830 and 1840, attempts were made in Sweden to manufacture beet-sugar, but the factories then started soon had to be given up, as the percentage of sugar extracted was too small. Though experiments were renewed from time to time, especially in the beginning of the seventies, the industry cannot be said to have really taken firm root in Sweden until the first half of the eighties.

In 1901, there were 20 *factories* making beet-sugar in Sweden, one in Blekinge, one in Gotland, the others in Skåne. Of the latter, 3 were so-called syrup-stations (see below). The Swedish sugar factories, as regards technical equipment, are fully abreast of the times; the larger of them are capable of working up as much as 1,000 tons of beet *per diem*, corresponding to about 120 tons of sugar. This rapidity of production has had as a result the limiting of the *season* of manufacture; by law it extends from September 1 to August 31, but does not as a rule begin until October, and many factories have now completed the working up of their beet by Christmas-time.

The diffusion-method is employed at all the factories; the beet is cut into slices which are thoroughly steeped in warm water in diffusers. At the syrup-stations, only steeping is done, the syrup being afterwards conducted in underground pipes to the main factory.

The seed required for the cultivation of the beet is purchased abroad. The *crop of beet per hectare* varies between 235 and 320 quintals, the average being estimated at upwards of 290. By way of comparison it

TABLE 117. *Manufacture of Beet-Sugar in Sweden.*[4]

Average for the years[1]	Factories.	Beet-land. Hectares.[2]	Beet worked. Quintals.	Production in quintals. Raw sugar.	Production in quintals. Molasses.	Percentage of Yield.[3] Raw sugar.	Percentage of Yield.[3] Molasses.
1876/80	1	400	113,300	9,472	—	8·34	—
1881/85	2	1,150	327,124	28,505	12,635	8·69	4·06
1886/90	4	4,150	1,162,286	118,241	37,354	10·34	3·18
1891/95	13	14,800	4,157,316	460,664	116,914	11·20	2·83
1896/00	19	26,048	7,170,543	898,706	190,317	12·54	2·69
In 1895	18	18,648	5,387,089	621,143	157,534	11·61	3·03
» 1896	19	28,360	8,902,404	1,055,562	251,789	11·86	2·83
» 1897	19	23,665	7,161,412	889,353	207,313	12·42	2·89
» 1898	19	22,793	4,809,315	593,162	131,538	12·33	2·74
» 1899	19	26,470	6,220,466	808,107	186,537	12·99	3·00
» 1900	19	28,950	8,759,116	1,147,347	174,410	13·10	1·99
» 1901	20	27,570	9,037,923	1,253,793	162,141	13·87	1·79

[1] The figures for years given here, denote the *beet-seasons*, consequently periods commencing during the year named and coming to an end in the following one. — [2] For the years 1876/94, the number of hectares are roughly estimated upon the basis of a crop of 280 quintals per hectare. — [3] The figures for the five-year periods are averages of the percentages of yield for the respective years. — [4] An hectare = 2·47 acres. A quintal = 1·97 cwts.

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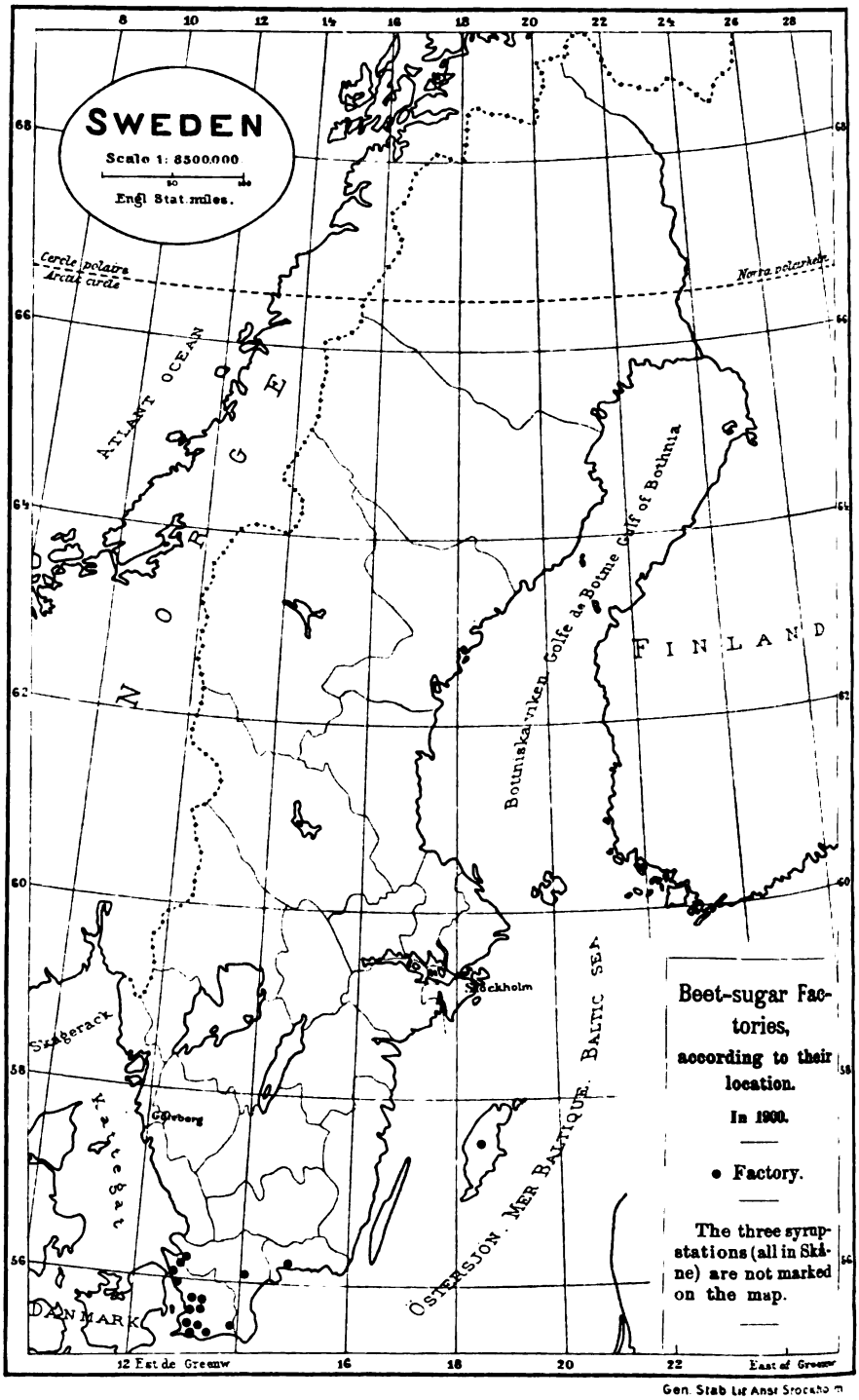

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may be noted that the figure for Western Europe is 270. The *yield of sugar per hectare* in Sweden is 35 quintals, in Western Europe 32, in Germany 40. The percentage of sugar in the beet has averaged for a five-year period 12·2 in Western Europe, and, as is shown by Table 117, the same figure represents the state of affairs in Sweden in later years. In 1901, Sweden's percentage was even 13·9 %.

Karpalund Sugar-Factory.

There has of old been a customs duty on sugar in Sweden, the revenue yielded thereby having been very considerable. Since July 1, 1873, the home production has been **excised.** This has all along been done in the form of a beet-tax, based on an assumed fixed percentage of sugar in the beet; the amount depending upon the current customs duty on unrefined sugar, to begin with 20 % of it, later 40 %, and at present 50 %; the last figure has ruled since 1891. As the customs duty is 23·5 öre per kilogr., the excise is 11·75 öre.[1] The yield, at first assumed at 6·25 % of the weight of the raw beet, has been gradually raised, so that since 1902 it has been reckoned at 12 %.

The control exercised is very simple. It takes effect on the weight of the beet. The weighing of the beet on arrival at the factory is controlled and registered by *Comptrollers*, who are superintended by a *Comptroller General* over several factories. In the last resort the manufacture of beet-sugar is controlled by the Head of the *Control and Assay Office* of the Finance Department. The Royal edict now in force dealing with beet-sugar manufacture, dates from May 19, 1893, but has been subsequently amended in certain particulars.

The principal *cause* of the rapid rise of the sugar industry in Sweden is to be found in the very considerable protective duty on imported sugar. In spite of the increase in the rate of the excise levied upon

[1] One hundred öre per kilogram = 6 pence or 12·2 cents per avoirdupois pound.

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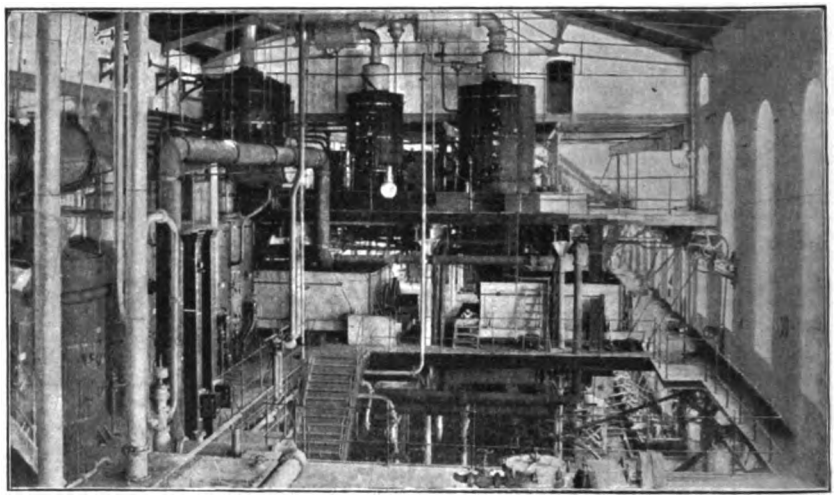
the home manufacture, the contemporaneous increase of the percentage of sugar yielded and extracted has kept the protective duty fully efficaceous, for though its value has varied, yet it has never sunk below 13·2 öre per kilogr. of raw sugar (i. e. 0·8 penny or 1·6 cent per lb). Moreover, the establishment of new factories has been facilitated by a resolution passed in 1893, whereby any new factory situated at least 30 kilom. (or 19 Engl. miles) from an already established one that is in working, should be charged a lower excise for the first five years than the factories of older standing. Four factories altogether have availed themselves of this alleviation. Since Sept. 1, 1900, however, all these special privileges have been done away with.



Interior of the Karpalund Sugar-Factory.

Owing to the rise of a home production of sugar, the *import* of that commodity, which used to be very large, has dwindled almost away. The **consumption,** however, has increased to such an extent, that Sweden ranks now, relatively speaking, among those countries in Europe where most sugar is used. Figures on this point, both for Sweden and other countries, are given on pp. 154 and 156. The countries ahead of Sweden in this particular have attained that position owing to the extensive use of sugar for *export industries.* As this can hardly occur in Sweden in the immediate future, and as any export of sugar itself is scarcely possible because of the bounties given to export by the larger countries (or, subsequent to the abolition of the bounties, in any event difficult, owing to the mass-production of these countries), it would seem as though the sugar industry in Sweden is likely to remain about stationary. For a further extension other conditions than those at present existing are plainly requisite.

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Sugar Refineries.

Of sugar refineries some are in direct connection with one or more of the raw sugar factories. Between 1870 and 1880, the annual production of refined sugar from all refineries was 162,000 quintals, between 1880 and 1890, 323,000, and between 1890 and 1895, 530,000 quintals (à 1·97 cwts.). In 1900, the total had risen to 864,727 quintals, besides 33,481 quintals of treacle and molasses. The number of refineries has remained about the same during that period, being at present 9, of which one is both refinery and raw-sugar factory. The total number of workmen in their employ, in 1900, was 2,402.

Owing to the fact of beet-sugar being almost exclusively used in the refineries, the **treacle** obtained in the process cannot be utilized in the preparation of food; it has to be put to the same uses as beet-molasses. It is only the treacle obtained in refining colonial sugar (from the sugar-cane) that can be employed as human food; that is imported at present in large quantities, chiefly from England and Denmark. The ordinary qualities of **sugar used as food** are: *refined sugar*, occurring as loaf, lump and granulated sugar, and *farina* resembling the powdered sugar, formerly so common, which was the raw sugar obtained by working up the juices of the sugar cane.

Molasses from beet-sugar factories and refineries that deal only with beet-sugar, contain, it is true, about 50 % of sugar, but have both a disagreeable taste and smell. They are employed consequently in one or other of the following ways: to a small extent for the production of pure sugar, alone or in conjunction with other substances (such as beet-sugar and substances containing a large percentage of protein), as fodder for cattle, or in the distillation of spirit. Finally, in the year 1896, a *molasses refining factory* was established, with the object of removing those bad-smelling and bad-tasting qualities in the molasses, which prohibit their being employed as treacle suitable for food. Previous to 1895, most of the molasses was exported to France, and in 1894 the export of that commodity amounted to 105,000 quintals, but by reason of the increase of the customs duty upon molasses in France, the export has now almost dwindled away. — The *beet remaining*, subsequent to the diffusing process, in weight about 40 or 50 % of the whole, is used up as fodder for cattle.

The customs duty on sugar and treacle has varied very considerably. For refined sugar it is at present 33 öre per kilogr. (about 2 pence per lb.) and for treacle 10 öre. When refined sugar, that is to say loaf, candy and cake sugar, is exported, if manufactured from imported raw sugar subject to customs duty, a *restitution duty* is returned of 28·2 öre per kilogr. No such advantage is, however, allowed on sugar exported when the raw material is of home growth.

Sweets, Chocolate, and Coffee Substitutes.

As a substitute for coffee-beans, commodities of different kinds are employed, for instance: roasted grain and malt, with or without an addition of sugar or treacle, the roasted root of cichorium intybus; the roasted root of the dandelion; or roasted beet. Malmö is the chief center for the manufacture of sweets, chocolate, and coffee substitutes, for while the total value of the manufacture of these commodities, in 1900, throughout Sweden was 5,653,000 kronor, no less than 2,219,000 accrued to Malmö alone. The largest factory is that of *Cloetta Brothers*. — Cocoa is *imported* mainly via Hamburg, powdered cocoa principally from Holland.

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Spirit Distilleries.

In the production of spirits, potatoes are principally employed, though grain of all kinds are also used and, to some extent, molasses and beet. Of the ordinary cereals, rye, barley, and mixed corn occupy the most prominent place, barley, otherwise employed in the manufacture of malt, coming first.

In years when the potato crop is a poor one, certain quantities of maize are imported for use in the distilleries. With regard to the use of the potato in distillation, it was soon after its introduction into the country, about 1750, that its applicability to this purpose was found out, though it was probably not until some fifty years later that its employment became at all general.

In years when the potato crop is an average one, about 62 % of all spirits distilled are produced from potatoes, 30 to 35 % from maize and grain, and the rest from molasses and beet. As to the proportion of the crops used for spirits, it may be mentioned that, in 1872, 17 % of the total potato crop and 1·5 % of the grain-crop found their way to the distilleries, whereas in 1896 the figures were 7·4 % and 0·82 % respectively. It should, however, be stated that a not inconsiderable quantity of rye is imported for use in the German yeast factories; if that amount be deducted, the portion of the home grain crop used for the production of spirits is so much less.

The spirit industry is becoming more and more an independent one. In earlier times, and as late as in the seventies, it was partly carried on as a branch of agriculture. Thus, the number of distilleries with an annual turnout of more than 5,000 hectoliters — for Sweden undoubtedly a large quantity — was 5·6 % of the total number in 1886, but more than 20 % in 1900. The number of small distilleries is decreasing.

In the middle of last century, all the different parts of the country were concerned in the distillation of spirits, now it is chiefly done in the provinces of Östergötland, Vestergötland, Skåne, and Blekinge. The Län of Kristianstad, in Skåne, is the chief center of the industry, half the total turnout emanating from there.

A special branch of Swedish spirit-distillation is the experiment made with *lichens*. Professor *Stenberg* suggested the process, and it was carried on during the years 1867/77. The reindeer-moss contains a species of cellulosa that saccharifies readily and soon commences to ferment alcoholically. The spirit made from lichens had, however, a peculiar flavour which rendered it difficult to dispose of in the market.

Taxation. The distillation of spirits began in Sweden as early as the 15th century, but was not subjected to any control until the year 1638, when a levy on the manufacture was made for the first time, distillation for home consumption and that for sale being treated on different bases. From that time onwards, the distilling industry has had a very chequered career, having been altogether prohibited in years when the grain crop has been small. In 1775, the distillation of spirits became a monopoly of the State, being carried on at Crown distilleries. This state of things was, however, abolished in 1798, license to distil having already in 1787 been hired out to private persons.

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TABLE 118. *The manufacture of Spirits.*[4]

Average for the years[1]	Factories.	Steam engines.		Raw materials employed.			Spirits manufactured.[3]	
		Numbers.	Horse-power.	Grain. Quintals.	Roots. Hectoliters.	Molasses. Quintals.	Total. Hecto-liters.	Per day. Hecto-liters.
1871/75	429	?	?	399,835	2,634,259	9,130	**457,188**	11·74
1876/80	380	70	640	346,464	2,314,424	3,352	**445,019**	12·01
1881/85	293	93	833	292,505	1,839,717	5,333	**381,440**	13·99
1886/90	172	107	920	243,293	1,505,404	5,281	**336,430**	15·47
1891/95	138	113	1,016	292,878	1,240,212	16,152	**330,182**	17·14
1896/00	129	120	1,217	361,092	1,284,673	36,662	**395,947**	20·15
In 1900[2]	131	127	1,428	525,762	802,620	53,720	**450,888**	21·98

The system adopted in some countries of fixing the quota of spirits allowed to be distilled, was once tried in Sweden too, for in 1799 the amount to be distilled was restricted in accordance with an assumed consumption of 11·8 liters per male and 5·9 liters per female of over 15 years of age, or an average of 6 liters per inhabitant of the whole population. (This quantity, which was thus at that time considered a reasonable amount, is somewhat less than the lowest average in recent times, or 6·67 liters per inhabitant in 1891/95). Already in 1800, however, this arrangement was abandoned and it was enacted that, in the rural districts, only farmers should be entitled to distil, and the size allowed for the still was made proportionate to the size of the farm.

In the beginning of last century, the *taxation* of spirits was made to depend on several different factors, viz., the cubic contents of the still, the assessed value of the farm, and the amount of consumption. Since 1855, a new system has been in vogue, a certain rate being fixed for a liter of spirits of 50 % in volume of alcohol, at 15° Celsius. Spirits with that proportion of alcohol are called *proof spirits* and this is what is meant by »spirits» in all legal enactments and business transactions. The strength and temperature of spirits are determined by so-called *thermo-alcoholometers*, the reduction to the standard being effected by means of tables worked out for the purpose. The excise, which in 1855 was 19·1 öre per liter, has several times since then been raised, in 1903 to 65 öre per liter of spirits, containing 50 % of alcohol (thus 3 shillings 3 pence per imp. gallon or 65 cents per winch. gallon). Of the total amount produced, 2 % is not subjected to excise.

Since 1884, the measurements of spirits for the purposes of excise have been taken by a *Controlling Apparatus*, constructed by Gebrüder Siemens of Berlin; this apparatus not only registers the total number of liters of spirits that pass through it, but also the number of liters of the same spirits as reduced to proof spirits; hence, the apparatus itself does the necessary reduction for purposes of excise. These apparatuses are established by, and belong to, the State. At every distillery there must be a *Comptroller* present while the distilling is in progress, to watch the manufacture, take down the figures registered by the Controlling Apparatus, and see that sufficient spirits are kept in stock in a receptacle to which he has sole access, to cover the value of any unpaid excise. A *Comptroller General* exercises supervision over a number of distilleries; he alone has the right to open the controlling apparatuses and is required to keep himself informed of the way

[1] Years ending September 30. — [2] The exceptionally large amount of grain, and the small amount of roots used that year, were due to the failure of the potato-crop. — [3] Reduced to 50 % of alcohol. — [4] A quintal = 1·97 cwts. A hectoliter = 22·01 imp. gallons or 26·42 winch. gallons.

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they work by testing them at frequent intervals. Final supervision of the manufacture of spirits in the whole country is exercised by the Head of the *Control and Assay Office* of the Finance Department.

The law now in force *regulating the manufacture of spirits* dates from July 13, 1887, but has been amended in some points subsequently. The distilling year runs nominally from October 1 to September 30, but embraces in reality only the seven months October to April; it is only those distilleries which also manufacture German yeast that are allowed to go on working during the months May to September.

Information as to **legislation regarding sale of spirits** is given in the article on the Temperance Movement. In the same place, and also on pp. 154 and 156, will be found data concerning the **consumption.** It may be here noted with regard to the latter that the import of *cognac* averaged for the five-year periods 1871/1900, 10,782, 15,745, 13,274, 9,910, 9,396, and 11,304 hectoliters annually. Corresponding figures for *arrack* were 13,957, 10,252, 8,701, 8,232, 7,662, and 8,618. In the general figures for the consumption of spirits, in the places just referred to, these two as well as other varieties of imported spirits are included.

Distillation. By far the greatest proportion of the spirits consumed in Sweden is rectified, either by means of charcoal filtration alone or by re-distillation, with which process fresh charcoal filtration is often combined.

The re-distillation of crude spirits is effected in special rectifiers in which fusel-oil and other impurities are separated and ethyl alcohol is obtained in a pure or almost pure state. Though several distilleries are now furnished with their own rectifiers, the rectifying of spirits is carried on principally as a special industry at factories where distilling is not done. In 1900, there was a total of 21 establishments for the rectifying of spirits, 7 of them being at the same time distilleries; the total amount rectified being 387,002 hectoliters. At *Reymersholm*, near Stockholm, *Gothenburg*, *Kristianstad*, *Karlshamn*, *Motala*, etc., are to be found more important rectifying establishments.

The largest enterprise of the kind was the one started at **Karlshamn** about 1885; its object was to refine the crude spirits for subsequent exportation. Between 1885 and 1891, no less than 1,650,000 hectoliters of crude spirits of 50 % in volume of alcohol were dealt with at that establishment.

Rendering spirits undrinkable has been permitted since 1888; the restitution of excise follows as a natural consequence upon the process. The methods of effecting it are different, according to the purpose to which the spirits are to be applied. The ordinary agent is a mixture of 10 parts of methyl to 3 parts of pyridine base; 13 cubic centimeters of this mixture are added to one liter of spirits of standard strength; the methylated spirits resulting can be sold without let or hindrance. Of the excise of spirits 64 öre per liter is returned, being $^{64}/_{65}$ of the whole. Recently upwards of 20,000 hectoliters of methylated spirits (of 50 % of alcohol) have been produced annually.

Punch Manufactories. A kind of drink peculiar to our country is the so-called Swedish punch, a mixture of arrack, water, and sugar in certain proportions. There were 102 punch manufactories in Sweden in 1900, producing 31,980 hectoliters annually, some 2·5 % of which was exported. Punch is also made in great quantity by many of the »Bolag» selling spirits according to the »Gothenburg System». The consumption of punch in Sweden is likely of late to have decreased.

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Yeast.

The yeast required for the baking of bread was formerly obtained from the brewage of beer and small beer; it is now produced in *factories* established solely for the purpose, usually after the manner of distilleries. While, however, the chief importance in an ordinary distillery centers round the production of alcohol, in yeast-factories it is the amount of yeast to which attention is principally paid. It should be mentioned that it is possible to some extent to increase the yield of yeast at the expense of that of alcohol and vice versâ. Thus, the infusion of air into the yeast-mash is an especially efficacious method of increasing the yield of yeast. Yeast prepared in that way goes by the name of *aerated yeast*, in contra-distinction to that prepared without infusion of air, called *surface yeast*. While of the latter from 25 to 30 kilogr. of yeast is obtained from 100 liters of spirits of 50 %, the figure for aerated yeast can be brought up to almost 100 kilogr. Most factories now employ both these methods. Aerated yeast is considered to be less effective in use than *surface* yeast.

The wholesale manufacture of yeast may be traced as far back as about 1850, but the industry was not made an object for legislation until 1871. In that year, the distilleries making German yeast were allowed to distil during the otherwise prohibited months May—September (see page 786). The oldest known — and till 1873 the only — yeast-factories were those at Humlegården in Stockholm and at Nacka in the vicinity of the capital. From 1885 onwards the yield of yeast has been taken up in the reports of the distilleries. In 1900, the total production amounted to 27,850 quintals (a quintal = 1·97 cwts.). — Pure unmixed yeast is only exceptionally sold; in general, potato-flour to a weight of $^1/_4$ up to $^3/_4$ of that of the yeast is mixed in with it.

Vinegar Factories.

The vinegar on sale is, generally speaking, of two kinds: *vinegar of spirits*, prepared from alcoholic fluids by the agency of the vinegar plant with an abundant supply of air, and *vinegar of wood*, obtained by dry distillation of wood, principally that of leaf trees. While the vinegar of spirits, by reason of its method of preparation, contains but little strength (less than 8 % of acetic acid), rectified vinegar of wood is manufactured wholesale as ice-vinegar with a percentage of 100 of acetic acid, and must hence be considerably diluted for use in the preparation of food. The vinegar most in favour is that *of wine*, imported principally from France. A new variety of vinegar, at present but a curiosity, is *milk-vinegar* or lactica, containing a diluted solution of milk-acid which for its taste and as a conserving agency might possibly serve as a substitute for acetic acid. — The manufacture of the vinegar of wood (menthol) has been considerably extended latterly by reason of the employment of the refuse from the sawmills to that end.

In 1900, 20,496 quintals (à 1·97 cwts.) of vinegar were manufactured at 14 factories. The chief firms are *Th. Winborg & Co.*, Stockholm, making vinegar of spirits, and *W. Wendt*, Perstorp, making vinegar of wood; these two turned out more than 60 % of the total manufacture. In 1900, 37,037 kilogr. of vinegar and acetic acid were *imported*, chiefly from France. The *exports* were 111,615 kilogr. to Denmark, Norway, and the German Empire.

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Wine and Syrup Factories.

The production of **syrup from the juice of berries** mixed with sugar has long been a domestic industry in Sweden, all kinds of berries being made use of, especially raspberries, strawberries, gooseberries, currants, and certain kinds of cherries. Of late years, the wholesale manufacture, more particularly of variously flavoured lemonades, has been introduced, but for reasons of economy, the juices of the berries have been increasingly replaced by a variety of artificial essences and sugar, or to some extent saccharine, whereby the quality of the resulting drinks has been deteriorated. The manufacture of **berry-wine**, in the strict sense, flourished about 1875 for a brief season, but not until twenty years later did it acquire any firm footing in the country; now it is carried on more successfully by reason of its being based on more scientific principles and the experience gained from other countries.

The production of fermented berry-wines has also commenced to interest Swedes. Many of the berries found in the country, both under cultivation and growing wild in the woods, are suited for the purpose. The percentage of sugar, however, in the berries is so low that a considerable quantity of sugar has to be added in order to obtain the necessary strength of alcohol. By employing the ferment of natural wines as a means of fermentation, something of their bouquet can be communicated to the berry-wines. Berry-wines can also be made to ferment of themselves, i. e. by species of ferments present in the berries, and thereby a wine is obtained of a good enough quality, though not one that commends itself to an unaccustomed palate.

In 1900, there existed 33 manufactories of berry-wines and syrups, the value of their annual production being estimated at 594,000 kronor (à 1·10 shilling or 0·268 dollar). For the *imports* of wine cf. Table 44, p. 284. The whole of the consumption there spoken of refers to imported wines.

Breweries.

The old method of producing malt liquors was by infusion and top-fermentation. In 1844 this method was supplanted by the Bavarian improved method of decoction and bottom-fermentation, which owed its origin to Gabriel Sedlmayr of Munich and Anton Dreher of Vienna, and was introduced into Germany in the decade of 1831/40. From its introduction beer-making in Sweden was revolutionized and dates itself as an industry. Of the top-fermented malt liquors, most have all but disappeared; small beer, however, is still made in considerable quantities (with originally 4—6 % of malt-extract Balling) and porter to a less extent (originally 18—22 % of malt-extract Balling). The bottom-fermented malt liquors, comprehensively termed **Beer** or Lager beer (»Store» beer) in the following, are sold under different names such as:

Bavarian, Lager, München, Vienna, Extra Beer, etc. (brown)	12—16 % Ball
Pilsener Beer, Bohemian Beer etc. (light-coloured, bitter)	11—14 % »
Lager, Ice-Cellar, Pilsener Drink (less percentage of malt and hops)	7—12 % »

Of malt liquors, beer now stands easily first, both as regards amount of consumption, value of the manufacturing establishments, raw material, and manufactured article. Though exact figures are wanting, the *amount*

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of malt used up in the manufacture of beer and porter is probably no less than 450,000 quintals (à 1·97 cwts.), and for small beer 100,000, or together about 550,000, equal to 770,000 quintals of barley. The malt required is for the most part prepared by the breweries from Swedish barley, chiefly grown in the province of Skåne, and in the islands of Gotland and Öland. Only small quantities of Danish barley and of Austrian, Danish, and German malt are imported for the requirements of the breweries. Malt from wheat is used very little, and rice as a substitute for malt is only employed at very few breweries. *Hops* are chiefly derived from abroad; the home production is exclusively devoted to the making of small beer; all hops for the making of beer and porter are imported, principally from Bavaria and Bohemia.

The statistical data concerning the imports and exports of hops render it possible to form a very accurate idea of the extent of the manufacture of beer and porter during the last few decades. If we assume that 5 % of the excess imports is used for small beer, and that on an average 1/3 kilogr. of hops is required for every hectoliter of beer (lager beer, pilsener beer, lager drink etc.) and porter, the following averages are obtained for the consumption of hops and for the production of beer and porter during the stated periods (home production of hops being excluded): [1]

Averages.	Consumption of hops.	Beer and Porter manufactured.
1871/75	246,620 kilograms.	703,000 hectoliters.
1876/80	269,161 »	767,000 »
1881/85	310,866 »	886,000 »
1886/90	404,049 »	1,152,000 »
1891/95	467,173 »	1,331,000 »
1896/00	590,267 »	1,682,000 »

From the above it will be seen that the manufacture of beer has more than doubled since 1871/75; the annual amount of malt liquors at present must be about 1,630,000 hectoliters of beer, 50,000 hectoliters of porter and about 1,200,000 hectoliters of small beer (Svagdricka, of 4—6 % Ball.).

The number of *breweries*, according to official figures, in 1880 was 374, in 1890, 554, and in 1900 probably about 600. Most of these are situated in the country and are engaged in the manufacture of small beer. The lager-beer breweries proper are mostly in or near towns. Stockholm (annual production about 550,000 hectoliters of beer and porter), Gothenburg (ditto 250,000), Gefle, Malmö, Norrköping, Sundsvall, Uppsala, Karlskrona, Helsingborg, Eskilstuna, etc., possess breweries with quite modern equipment and with a considerable turnout. The greatest amount hitherto produced at any one brewery in Sweden in one year is probably 125,000 hectoliters.

Just as the brewery industry in Sweden borrowed its methods from *Germany*, so, too, the breweries themselves, even when constructed by Swedish firms — of which *Wiklund & Co.* in Stockholm is the chief one — are built and equipped on analogous lines to those in Germany. The facility with which Swedish brewers are able not only to acquire theoretical knowledge with regard to their branch in Germany and Austria, but also to become informed with regard to the various technical improvements in machinery and method from time to time introduced in those countries, has rendered it a matter of minor importance to seek to develop technical skill at home; as, moreover, that spur to the invention of new and im-

[1] A kilogram = 2·2 lbs. A hectoliter = 22 imp. gallons.

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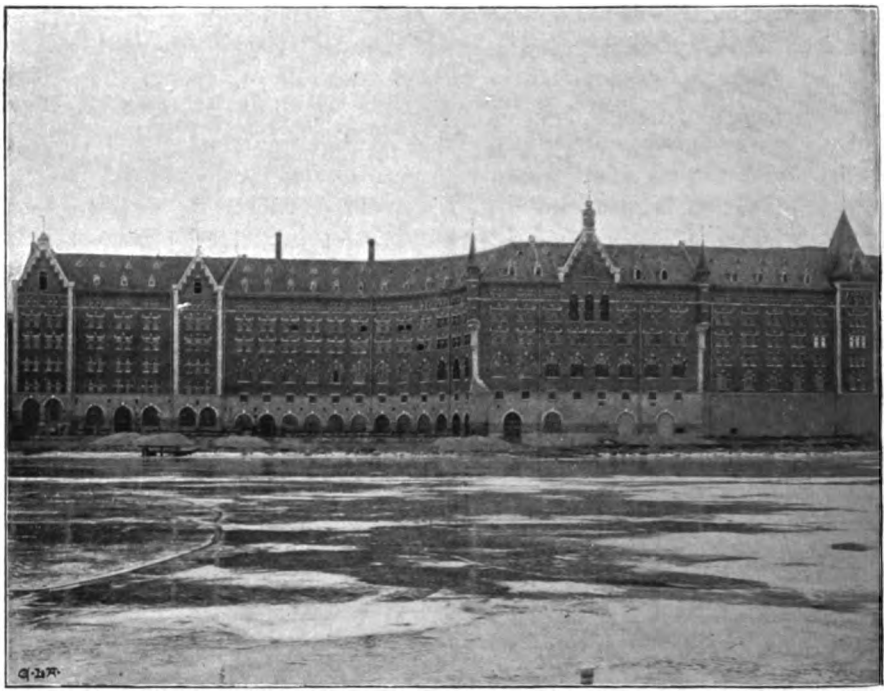

München Brewery, Stockholm. Photo. F. G. Klemming, Stockholm.

proved methods which a well adjusted excise on the manufacture of beer entails, has hitherto been wholly absent by reason of malt liquors having been, until 1903, exempt from excise, it is scarcely surprising that the brewing industry in Sweden displays but little originality in a technical sense. If thus the method of manufacture is principally the same in Sweden as in Germany — some few improvements have by way of experiment been latterly introduced from the United States — the method of sale, however, in Sweden, as in Norway and Denmark, has been from the start a different one from that in Germany; the beer is almost always drawn off into bottles before leaving the breweries. The appliances for cleansing, filling, and corking the bottles were first constructed in Sweden; thus the first practical machines for corking were of Swedish origin, though the improvements that have been made in them have emanated from abroad. So, too, a Swede, *Emil Boëthius* invented cork-cutting and cork-stamping machines that have attained a wide celebrity. — In tapping the beer for retail consumption, an invention by a Swedish engineer, *Rennerfelt*, promises well; his beer-siphons, worked by the pressure of carbonic acid gas, have not gained much favour in Sweden itself, but modifications have been introduced in Germany, and repeated attempts have been made to re-introduce them from there.

By *Axel Bergh* a closed wort centrifugal machine has been patented, designed both to provide the wort with the sterilized air required for its fermentation and to separate the wort from the grape; by its means are rendered superfluous the so-called drop-bags, which involve a great risk of the wort being infected by wild yeast and bacteriæ. In spite of the undoubted advantages of this simple and easily managed apparatus, it is only in a few breweries that it has been permanently adopted.

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Rockström's apparatus for the pasteurization of beer, patented in 1899, precludes the loss of any carbonic acid and removes the danger of the bottles bursting by subjecting them to a pressure from without equal in force to that which arises within when they are heated. This apparatus, constructed upon a new principle, will probably prove a successful rival to older ones.

In 1903, an **excise** was levied on the manufacture of beer in Sweden. This excise is a *malt tax*, and is due with 12 öre per kilogr. ($6^3/_4$ shillings or 1·64 dollar per cwt.), — though for the first 200,000 kilograms consumed during the year progressive from only 2 to 11 öre per kilogram. Brewery only manufacturing small-beer (Svagdricka, containing no more than $2^1/_4$ % volume of alcohol and brewed with wort not holding above 6 % of extract Balling) is exempt from excise.

The Manufacture of Malt.

The malt required for the brewing of beer was formerly very generally produced at the respective breweries, but now there also exist special establishments for its fabrication. Most of these malteries are in immediate connection with breweries; of 344, registered in 1900, producing a total of 519,321 quintals of malt, all but 17 were connected with breweries. The production of the 17 independent malteries amounted to about 60,000 quintals. As above stated (article: Breweries), the consumption of malt is about 500,000 quintals annually. (A quintal = 1·97 cwts.).

Malt Extract is made at certain chemists' shops for the preparation of maltos compounds, such as of maltos and iron, etc. The value of production, in 1900 was 29,000 kronor at 3 manufactories.

Mineral Waters and Soft Drinks.

A secure basis for the manufacture of these commodities has existed since 1875, thanks to *A. T. Almén's* valuable researches at that time into the character and qualities of natural and artificial mineral waters. A distinction can be made between *medicinal waters*, prepared from distilled water and a due quantity of chemically pure salts to produce exactly the same composition as that of corresponding natural waters, and *soft drinks*, in the preparation of which less care is observed. It will not be too much to say that the medicinal waters made by the best factories in Sweden are of most excellent quality, and that they, owing to their uniformity, are even superior to the corresponding natural waters. The waters produced by the *Chemists' Mineral Water Manufactory* (Apotekarnes mineralvattenfabrik) in Stockholm are specially celebrated.

There are, moreover, a large number of *natural springs* in Sweden, containing chalybeate waters of medicinal virtue. These waters are bottled and sold in many cases, for instance those of Porla, Ronneby, and Karlstad. The two last named are exceptionally rich in iron. Others, again, contain iodine, though only to a small extent. — Among soft drinks are to be reckoned *ginger-beer* and *fruit lemonades*, in the fabrication of which, however, artificial essences are largely used now in place of fruit juices.

In 1900, the number of factories under this heading was 240, with a total production of 149,011 hectoliters, being nearly 3 liters for every inhabitant.

Tobacco.

The earliest mention of tobacco in Swedish annals is in 1629. In 1641, the so-named Söderkompaniet (South Company) obtained the ex-

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TABLE 119. *Tobacco industry in Sweden.*[1]

Average for the years	Factories.	Production. In Quintals.				Total production.		Imports. Quintals.	
		Cigars.[2]	Packet Tobacco.	Roll and cake Tobacco.	Snuff.	Quintals.	Value. Thousands of kronor.	Leaf tobacco.	Manufactures.
1871/75..	103	4,698	4,159	8,737	28,423	46,017	8,872	31,915	562
1876/80..	107	5,512	4,825	9,327	32,191	51,855	10,778	35,125	1,242
1881/85..	105	4,229	4,780	10,007	32,812	51,828	10,831	32,784	1,022
1886/90..	92	2,916	2,780	11,868	35,084	52,648	10,316	34,206	1,071
1891/95..	91	5,011	3,797	10,791	39,331	58,930	11,994	34,029	1,064
1896/00..	96	6,940	4,058	8,821	45,847	65,666	15,045	36,604	1,737
In 1900..	101	7,463	3,846	8,502	48,869	68,680	15,714	37,190	2,042

clusive privilege of importing tobacco, and subsequently the trade in tobacco was alternately free or in the hands of companies, until 1685, when it was made entirely free.

The earliest *tobacco-factory* seems to have been founded in Stockholm in 1660; it was followed by several others, both in the capital and in the country. *Kockum's* Factory in Malmö and *Swartz'* in Norrköping date from about 1750. The *cultivation* of tobacco on a more extensive scale also began about 1750, and, in this branch as in so many others, the celebrated pioneer of industry, *Jonas Alströmer*, was to the fore. About 1770, the tobacco crop was estimated as amounting to 7,000 quintals (à 1·97 cwts.), that is to say, almost as much as at the present day. The annual crop in the period 1896/1900 is given at 7,745 quintals, a figure, however, probably rather below than above reality. An increase has not been noticed during the last years, — rather the reverse, the averages for the preceding five-year period (1891/95) being 10,837 quintals. The cultivation of tobacco in Sweden is exempt from any excise.

The cultivation of tobacco, instead of spreading throughout the country, has rather tended to become concentrated in certain districts, notably in Skåne and round Stockholm. As Swedish tobacco has a peculiar aroma, different from that of superior foreign brands, it cannot to any large extent be mixed with them. Such mixture only occurs for the cheaper varieties of cigars and snuff.

Tobacco is consumed in various ways: as pipe tobacco, cigars, cigarettes, chewing-tobacco, and snuff. *Pipe-tobacco* occurs either cut or in complete leaves, *chewing-tobacco* is usually twisted and sold in rolls. Of *snuff* the greater quantity is stated to be used for chewing. We have previously mentioned that the consumption of snuff is in Sweden unusually large.

The manufacture of tobacco is carried on in the large towns, more especially in Stockholm, Gothenburg, and Malmö; in those three towns there were 42 factories in 1900, manufacturing tobacco to the value of 9,727,000 kronor, that being 62 % of the value of the tobacco manufacture of the whole country (15·7 million kronor that same year). — *Imported* tobacco comes principally from America, by way of Bremen. It is either of the heavy type, such as Kentucky tobacco, or light, such as Virginia tobacco. The total value of the imports of tobacco (leaf and manufactured), in 1900, was 7·79 million kronor. The customs duty for these quantities amounted to 4·46 million kronor.

[1] A quintal = 1·97 cwts. A krona = 1·10 shilling or 0·268 dollar. — [2] Including cigarettes. For the years 1897/1900, on the supposition that 200 cigars weigh 1 kilogr.

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In 1900, the number of the *hands* employed in the tobacco factories was 4,499, of whom 2,752 were women. An exhaustive enquiry has been made into the conditions under which these hands work, this branch being the second on the list drawn up by the official Labour Statistics of Sweden. This report on the Tobacco industry was published in 1899.

Other Manufactures.

With regard to other industries concerned in the production of articles of food for sustenance or enjoyment, the following details may be given, including the number of employees and the total value of the production for the year 1900.

	Factories.	Workmen.	Value of production.[3]
Bakeries	33	717	5,597,000 kronor.
Factories for porkbutchers' commodities	40	304	4,157,000 »
Pig slaughter-houses	9	109	2,518,000 »
Fish-pickling businesses	47	678	1,939,000 »
Biscuit factories	3	240	765,000 »
Coffee roasteries	4	20	656,000 »
Preserve-factories	8	139	556,000 »

In reference to these figures, it should not be forgotten that only those establishments are here included which can be regarded as carrying on their business on wholesale lines. The greater part of the production in these branches is of course effected on a smaller scale and comes within the scope of domestic industries.

The bakeries were the first branch of industry to be subjected to official inquiry for the purposes of the Swedish Labour Statistics; hence, the conditions under which the employees in that industry work — in many respects peculiar — are comparatively well known.

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2. TEXTILE AND CLOTHING INDUSTRY.

This group, one of the most important of our manufacturing industries, on account of the great number of necessaries it comprises, is in the official statistics divided in the following way:

	Factories.	Workmen.	Production.[3]
Yarn and thread, etc.[1]	237	10,839	47,907,000 kronor.
Textile fabrics	180	14,730	57,869,000 »
Calendered fabrics	190	2,335	5,301,000 »
Articles of clothing, etc.[2]	195	9,283	23,657,000 »
Total, in 1900	**802**	**37,187**	**134,734,000** kronor.

Notwithstanding a production of such importance, this group of manufactures is one of those most oppressing our import, which testifies that the Swedish textile industry is far from sufficient for the country's

[1] Including rope-work, etc. — [2] All kinds of manufactures of spinning materials, such as textile fabrics, ribbons, embroideries, hats and bonnets, clothes, etc. — [3] A krona = 1·10 shilling or 0·268 dollar.

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TABLE 120. *Imports and exports of Textile raw materials, manufactures, and articles of clothing.* (A krona = 1·10 shilling or 0·268 dollar.)

Average for the years	*Imports.* Value in thousands of Kronor.				*Exports.* Value in thousands of Kronor.				In per cent of the total	
	Raw materials.	Yarn and thread, etc.[1]	Manufactures.[2]	Total.	Raw materials.	Yarn and thread, etc.[1]	Manufactures.[2]	Total.	Imports.[3]	Exports.[3]
1871/75..	20,558	8,635	37,574	**66,767**	307	178	2,009	**2,494**	27·10	1·22
1876/80..	16,842	8,202	38,427	**63,471**	294	286	2,766	**3,346**	23·63	1·60
1881/85..	20,433	9,375	51,394	**81,202**	394	506	4,182	**5,082**	25·58	2·09
1886/90..	23,864	10,356	55,520	**89,740**	366	1,043	5,594	**7,003**	26·75	2·57
1891/95..	20,592	11,936	48,415	**80,943**	122	1,052	7,879	**9,053**	23·02	2·85
1896/00..	24,666	17,419	44,505	**86,590**	176	1,080	4,461	**5,717**	19·14	1·59
In 1898..	23,343	18,283	45,316	**86,942**	122	616	1,751	**2,489**	19·09	0·73
» 1899..	26,881	20,938	46,738	**94,557**	281	972	1,579	**2,832**	18·74	0·79
» 1900..	30,379	15,787	41,959	**88,125**	232	1,271	1,545	**3,048**	16·47	0·78

own need. In Table 120 appears that the **imports** of hereunto belonging articles — raw materials as well as manufactures, — during 1871/80 amounted to 65 million kronor per annum; during 1881/90, to 85 million; during the years 1891/95, to 81 million; and in 1900, to 88 million kronor. In comparison with our total imports, a decrease is however noticeable, the imports of this group of manufactures in the beginning of the decade 1871/80 comprising 27 per cent of our entire imports, but nowadays only about 16 per cent.

A favourable circumstance is that the import of *manufactured articles* has rather diminished of late, whilst a considerable increase has taken place with respect to the import of *raw materials*, as well as of yarn and thread; this proves that our own textile industry is steadily increasing.

The exports of textile manufactures principally goes to Norway. After the revocation (in 1897) of the Special Commerce Treaty between Sweden and Norway (see p. 190) it has considerably diminished — though not in the proportion that is seen in Table 120. As we will several times have occasion to remind of, the Swedish accounts of the exports to Norway are in fact very *incomplete*, and this especially after 1897.

Our people has from time immemorial displayed considerable liking and natural taste for the textile arts. But if our native textile art goes back to remote ages, and our textile manufacturing industry to the days of Gustavus II Adolphus, nevertheless, this manufacture always was at first intended to supply the actual necessities of the country. One consequence of this is also that the fabrics produced in this branch of industry are generally of a simpler sort, suitable for use by the people at large. The home market is not extensive enough to repay the expenses connected with the manufacture of new or special products. And if the native manufacturer is, with any hope of success, to compete with the foreigner who is flooding our market with his products, he must avoid embarking in too

[1] Including rope-work, etc. — [2] All kinds of manufactures of spinning materials, such as textiles, ribbons, embroideries, hats and bonnets, clothes, etc. — [3] The last two columns show imports and exports of textiles in per cent of the total value of the Kingdom's imports and exports of all sorts of goods.

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precarious a province, but confine himself to the simpler and cheaper goods previously known to his customers.

For promoting skill in the textile industry, there are two **Weaving schools**, originally started by private persons, viz., *John Lenning's Weaving School* in Norrköping, and the *Borås Technical Weaving School.* The former was founded in 1879, through a donation of 300,000 kronor by a manufacturer, named John Lenning. This school has a more extensive course for training manufacturers, foremen, designers, etc., and a smaller one (chiefly with evening lectures) for workmen and apprentices in the trade. The weaving school in Borås was originally a private establishment formed by a teacher of weaving, named *S. F. Krebs*, but, at the suggestion of the Board of Borås Technical College, in 1866, passed into a public institution, and, at the present time, receives a support from the State of 4,800 kronor per annum and 2,900 from the County council in the Län of Elfsborg. — Besides these, there is a large number of weaving-schools for promoting *home manufacture* scattered all over the country, amongst which may be especially mentioned the Weaving School of the society »Friends of Handiwork» in Stockholm, the Tullgarn Weaving School, established and supported by H.R.H. the Crown Princess, Miss N. v. Engeström's School in Örebro, Johanna Brunsson's Practical Art Weaving School in Stockholm, Thora Kulle's in Lund, etc.

The Wool Industry.

The real improvement in Sweden's native breed of sheep did not begin till after 1715, when *Jonas Alströmer*, rightly called »the father of Swedish industry», began his experiments in naturalizing foreign breeds of fine-woolled sheep, particulary that of the Spanish merinos.

These experiments apparently succeeded in the beginning, so that in 1764 there were in Sweden no less than 89,000 sheep of a pure, and 23,000 of a mixed merino breed. Great efforts were made by the Government to increase the stock of fine-woolled sheep. Prizes were given for wool, sheep breeding farms were established, the so-called Wool Discount was introduced for granting loans to tradesmen in a small way of business at the purchase of native wool, in addition to which wool-stores and wool-markets were to facilitate its sale. Notwithstanding all that, this breed of sheep has been more and more decreasing, and at present hardly numbers 1,000. Several causes have contributed to this circumstance, especially the difficulty in disposing of native merino wool to the manufacturers, who preferred the foreign because the former was of very unequal quality. The thorough-breds imported at different times are also said not always to have been of the best kinds. Attempts to naturalize fine-woolled Angora goats turned out even a greater failure.

During the whole of this time — the Alströmer period — attention had been exclusively directed to the production in this country of *fine* wool or merino wool; when, however, after nearly a century of incessant attempts to promote the use of native wool in our manufactories, these had not proved successful, then people began to see that even the coarser wool might be deserving of attention.

The next phase in the history of our wool production, beginning with the nineteenth century, thus gave a new impulse to this industry. Instead of, as before, chiefly regarding the fineness or quality of the wool, stress was now laid on increasing the quantity of coarse kinds of wool. And these attempts, in spite of many unfavourable circumstances, have proved profitable. Besides our native unimproved country sheep — the so-called peasant breed — the wool of which is uneven and somewhat coarse, chiefly fitted for coarse textures (homespun or rough clothing), there are at present the following breeds, mostly imported from

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TABLE 121. *Survey of manufactures and imports in the Wool industry.*
(A quintal = 1·97 cwts. A krona = 1·10 shilling or 0·268 dollar.)

Average for the years	*Spinneries.* Manufactures.[1]		*Cloth-factories.* Manufactures.	*Imports.* Value in thousands of Kronor.				
	Quintals.	Value, in thousands of Kronor.	Value, in thousands of Kronor.	Wool.	Yarn.	Textile fabrics.	Total.	Textile fabrics. %
1866/70.....	668	92	9,569	.	.	5,194	.	.
1871/75.....	1,642	253	13,613	6,320	3,692	16,118	26,130	61·7
1876/80.....	3,098	709	10,743	4,486	3,032	16,924	24,442	69·2
1881/85.....	6,545	1,288	11,880	5,428	3,479	21,804	30,711	71·0
1886/90.....	16,136	3,167	12,816	6,874	5,179	22,373	34,426	65·0
1891/95.....	22,937	4,276	19,389	4,820	6,511	20,227	31,558	64·1
1896/00.....	65,064	16,862	26,765	7,332	10,503	15,800	33,635	47·0
In 1900.....	73,519	20,429	28,981	9,859	9,496	13,202	32,557	40·6

England, viz., Southdown, Shropshiredown, and Oxfordshiredown (especially in Södermanland, Skåne, and Halland), further Leicester, Dishley, and Cheviot — the latter especially in Gotland and Norrbotten, — and, finally, the merino breeds (Östergötland, Södermanland). According to later observations, it looks as if the Cheviot breed in Gotland would still further increase, where it has, under otherwise favourable circumstances, found protection in the old Roma State sheep-farm; just as the long-haired breeds (Oxfordshiredown, etc.) more and more increase and supplant the white-headed ones (Leicester, Cotsewold, etc.). Among native breeds, the Gotland sheep on the island of Fårön has begun to attract notice as a breed in many respects suitable for our country. One circumstance which speaks for the improvement of the native breed with English and not merino sheep, is that the latter do not make good mutton.

The stock of native sheep has nevertheless decreased still more. Whilst in 1870 it amounted to 1,600,000, there are now only about 1,260,000, of which more than 110,000 in the Län of Jönköping. The cause of this decline must be sought partly in the circumstance that the native wool, from its unevenness and the difficulty in obtaining it in larger parcels, is not readily bought by manufacturers, and that the wool-market is overflooded with foreign and artificial wool (shoddy, mungo, extract, etc.); and partly in the farmers having inclosed larger spaces for dairy purposes, in addition to which the lack of fodder, which often occurs in certain parts of the kingdom, is a primary reason for slaughtering sheep. For the encouragement of the breeding of native sheep, the State has in recent times appointed a specialist to give *instruction* in wool-culture and sheep-farming.

The wool imported, which is admitted free of duty, is brought for the most part by way of England and Germany, but also via Denmark and Belgium. The superior sorts of carding-wool originally came from the Cape, Buenos Ayres, Australia, and Silesia.

A summary of the **production value** in our wool industry is given in Table 121. Of all woollen yarn produced in Sweden, the Östergötland Län alone delivers 35 %, of textile fabrics even 46 %. The last mentioned table also gives the value amounts of the *imports* (for the quantities, see Table 122). On the whole, all the figures bear witness of a considerable increase of the manufacture of late, whilst the imports nowadays keep about stationary. A pleasing fact is that the imports of

[1] The figures for earlier years are *very incomplete.*

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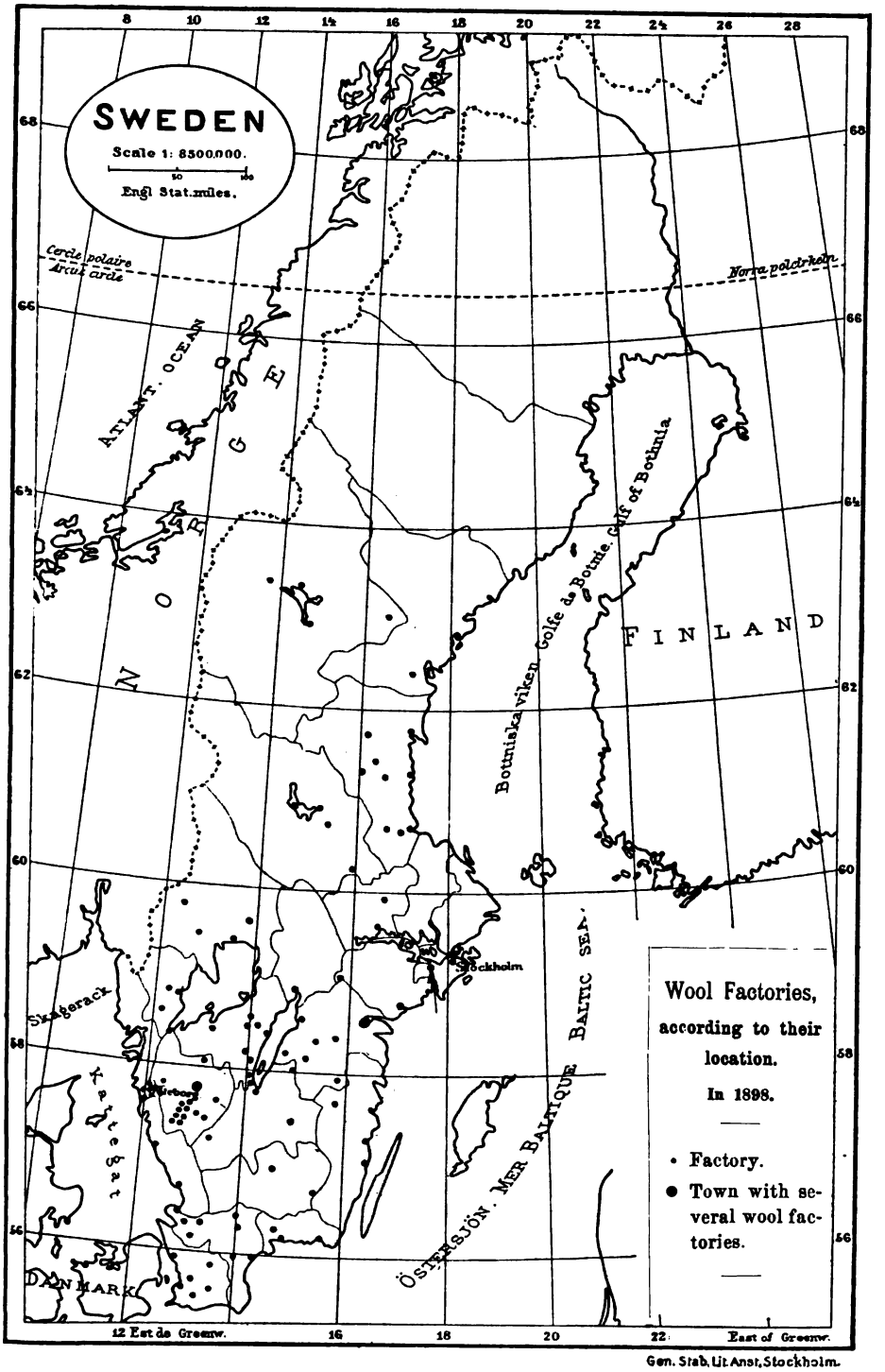

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TABLE 122. *Imports and exports of wool and woollen stuffs.* In quintals à 1·97 cwts.

Average for the years	Wool.		Woollen yarn, undyed.		Woollen yarn, dyed.		Woollen cloths.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1861/65	12,877	110	693	—	1,118	2	4,935	36
1866/70	13,753	202	626	3	1,322	1	5,213	246
1871/75	17,524	318	1,427	4	3,420	6	16,000	460
1876/80	13,731	146	1,525	2	4,072	7	16,842	894
1881/85	18,429	271	3,910	3	5,435	27	22,442	1,023
1886/90	21,790	286	8,950	45	5,752	460	23,062	1,586
1891/95	24,001	252	14,263	53	4,528	777	25,776	2,603
1896/00	33,602	491	21,468	116	5,188	1,076	22,399	2,385
In 1900	40,950	615	16,749	403	4,850	1,424	17,300	872

textiles, both absolutely and relatively, has diminished; in 1881/85, 71 % of the entire import were textiles, whereas in 1900 only 41 %.

The wool manufactories of Sweden are to a large extent situated in Norrköping, where in 1850 there were no less than 122 cloth manufactories, but now, since the smaller ones have for the most part disappeared, only about 30, amongst which may be mentioned the *Drag*, *Bergsbro*, *Gamlabro*, and *Ström* joint-stock companies. Norrköping, »the Manchester of Sweden», has a particularly advantageous situation for this industry, having abundant supply of waterpower. For more than 200 years, this town has been the center of a flourishing textile industry. Among the other larger wool manufactories, may be mentioned *Stockholms yllefabrik*, *Malmö yllefabrik* (with 374 looms and 12,340 spindles), *Wallbergs fabriksaktiebolag*[1] in Halmstad, *C. O. Borgs söner* in Lund, as well as several factories in Borås, amongst which a wool and vigogne spinning-mill, and also a worsted spinning-mill. There is also a number of spinning-mills in the rural districts, mainly for the treatment of native wool.

Whilst the larger factories have become more and more developed, even if partly at the expense of the smaller ones, the value of production has during the last thirty or forty years been doubled or trebled. The manufacture of fine cloth for wearing apparel seems gradually to be decreasing, whereas the contrary is the case with regard to the coarser kinds. The *Drag* joint-stock company's manufactures of cloth for uniforms, suits, and overcoats, of black cloths, satins, and twills are well-known and, in respect to quality, can compete with the best foreign fabrics. Coarser cloths, such as duffel, baize, corduroy, and frieze, etc., are manufactured on a large scale in Sweden, as well as shawls, rugs, blankets, flannels, and linsey stuffs (thread-cloth, buckskin, velvets, etc.). Latterly combing-wool cloths for ladies have begun to be manufactured by *Aktiebolaget Merinos*[1] in Borås, as cheviots, thibet, paramatta, etc., both pure wool

[1] Aktiebolag = joint-stock company. Ylle = wool.

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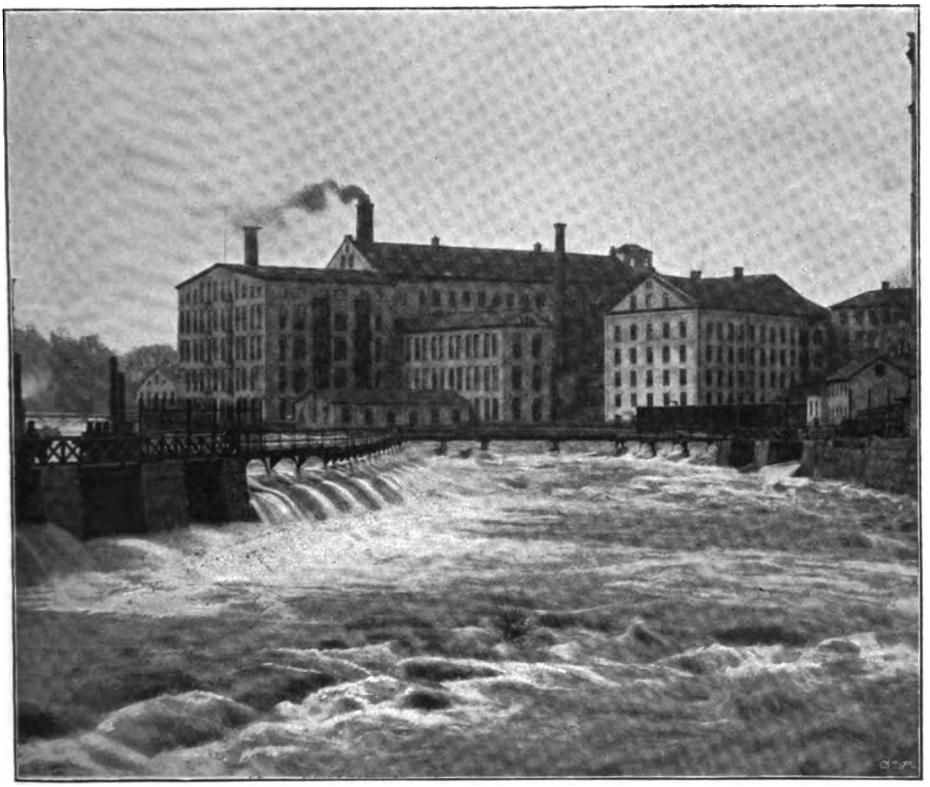
and linseys, twills, black and fancy cloth for ladies' dresses. *Wallbergs fabriksaktiebolag*,[1] Slottsmöllan in Halmstad, occupies a conspicuous place. There is manufactured woven felt (for paper- and wood-pulp machines, filtering, etc.) as well as pressed (felt squares, pipes, felt for isolating purposes). Even pattern-weavings with Jacquard wool are produced at several factories, particularly damask for furniture and carpets, both the simpler kinds (floor-cloths) and so-called Axminster. The *Stockinet* manufacture, i. e. machine-made woven stuffs, is of great importance. This manufacture, the value production of which has increased by six times during the last twenty years, uses both pure wool and wool mixed with cotton (vigogne thread) and also old carded stuffs.



Drag Cloth-Factory, Norrköping.

Of the **wool consumed** by wool factories, amounting to about 6 or 7 million kilograms per annum, about 45 % is imported, 10 or 15 % consists of native wool, and the remaining 40 or 45 % of artificial wool (carded worsted, shoddy, mungo, extract, or such like). Among the imported wools may be noticed also the so-called »noils», or the waste-wool left in the process of wool-combing, which is mixed with other wool. The import of worsteds amounts to nearly half of

[1] **Aktiebolag** = joint-stock company.

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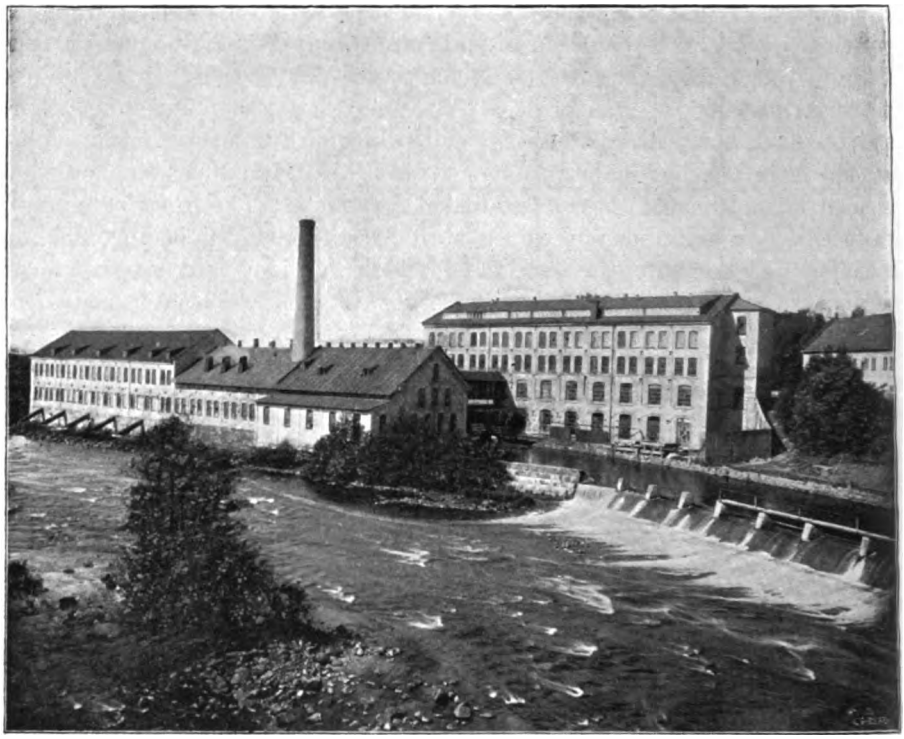

Slottsmöllan Cloth-Factory (*Wallbergs fabriksaktiebolag*), *Halmstad.*

the whole country's consumption of such textile fabrics — during the last years considerably less.

Quite an important industry has in recent years been founded in Sweden as well as abroad in using **old wool stuffs as raw material,** either by themselves or with a mixture of wool or cotton. By tearing up unfulled stuffs, worsted, etc., a better and longer haired material (»shoddy») is obtained than from such as have been fulled (»mungo»), which by tearing become shorter and more worn. Nevertheless, a large quantity of such material is produced — a fabric often testifying to great skill on the part of the worker — such as rugs, blankets, and shawls, coarse stuff for cloaks and coats, and common cloth for wearing apparel.

The Cotton trade.

This manufacture, which certainly occupies a very important place in the textile industries of Sweden, is, however, confined chiefly to the simpler stuffs, viz., cotton and twills, drill, dress materials, ginghams, fustian, sail-cloth, and cotton diaper.

The whole **production** of our *cotton-mills* was estimated at 12·40 million kronor per annum during the last half of the decade 1861/70, during the earlier half of the decade 1871/80 at 14·39 million; but during the last half, only at 12·28 million. The production then remained at this amount up to quite recently, when, in 1900, an amount of 20·72 million kronor was reached. From the *cloth-*

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factories the following figures are given: for the decade 1861/70, a yearly production of 4·67 million kronor; for 1871/80, 10·12 million, without declination during the last part; for 1881/90, 12·71 million; and for the decade 1891/1900, 16·92 million kronor. Also here the value of production was stationary quite a long time, but for 1900 it is stated to be no less than 23·23 million kronor. — Of the whole production of the cotton-mills during the last mentioned year, 35 % came on Elfsborg Län, 25 % on Göteborg och Bohus Län, and 19 % on Östergötland Län; of the production of the cloth-factories, 42 % came on Elfsborg Län, 25 % on Göteborg och Bohus Län, and 20 % on Östergötland Län. — The number of workmen employed in the cotton industry amounted in 1900 to 11,919, of which 5,783 in the cotton-mills and 6,136 in the cloth-factories. Out of this number 1,981 are in Norrköping, and 1,395 in Borås.

The imports are, with regard to the quantity, accounted for in Table 123. The value of the same was estimated in 1900 at 14·35 million kronor for cotton; for cotton yarn at 2·78 million; for thread at 2·45 million, and for textile fabrics at 6·51 million, or altogether 26·09 million kronor. The importation of cotton shows a particularly steady increase. *The exports* principally go to Norway; concerning the decrease in later years see page 794.

TABLE 123. *Imports and exports of Cotton and cotton-stuffs.*
In quintals à 1·97 cwts.

Averages for the years	Cotton.		Yarn.		Thread.		Textile fabrics.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1861/65	29,397	—	3,336	490	245	—	3,194	101
1866/70	54,542	—	5,049	140	354	—	3,752	1,077
1871/75	79,220	—	16,366	338	722	2	10,170	1,347
1876/80	83,851	—	17,789	800	1,137	5	8,123	1,771
1881/85	109,806	—	20,976	2,849	2,023	17	10,384	3,655
1886/90	117,481	—	17,036	5,127	2,503	23	12,176	4,755
1891/95	141,476	—	21,329	4,812	2,944	4	15,415	8,059
1896/00	166,779	—	30,836	3,625	3,159	—	18,561	5,657
In 1900	170,781	—	18,103	2,132	3,162	—	16,222	1,198

Among the larger factories of these stuffs may be mentioned *Gamlestadens fabriker* in Gothenburg (with 40,600 spindles, 710 looms), *Rosenlunds* spinning-mill in Gothenburg (with 28,000 spindles), *Norrköpings bomullsväfveriaktiebolag*[1] (25,400 spindles, 926 looms), *Holmens fabrik*, and *Bergs bolag* in Norrköping, *Nääs* spinning-mill, *Viskafors*, *Rydboholm*, *Fritsla*, *Jonsered* factories, etc. In Stockholm there is a large spinning-mill and cloth factory at *Barnängen*, and Gefle Manufacturing Company has a factory at *Strömsbro*.

Of late years, efforts have also been made in this branch of industry to manufacture goods that demand greater skill on the part of the workmen, and this with great success. For instance, *The Swedish Curtain manufactory* (Svenska gardinfabriken) in Gothenburg (with a branch in Kristiania, after the revocation of the international Swedish and Norwegian Commerce Treaty) fabricates so-called thread curtains or

[1] Bomullsväfveriaktiebolag = Cotton weaving-mill joint-stock company. Bolag = company.

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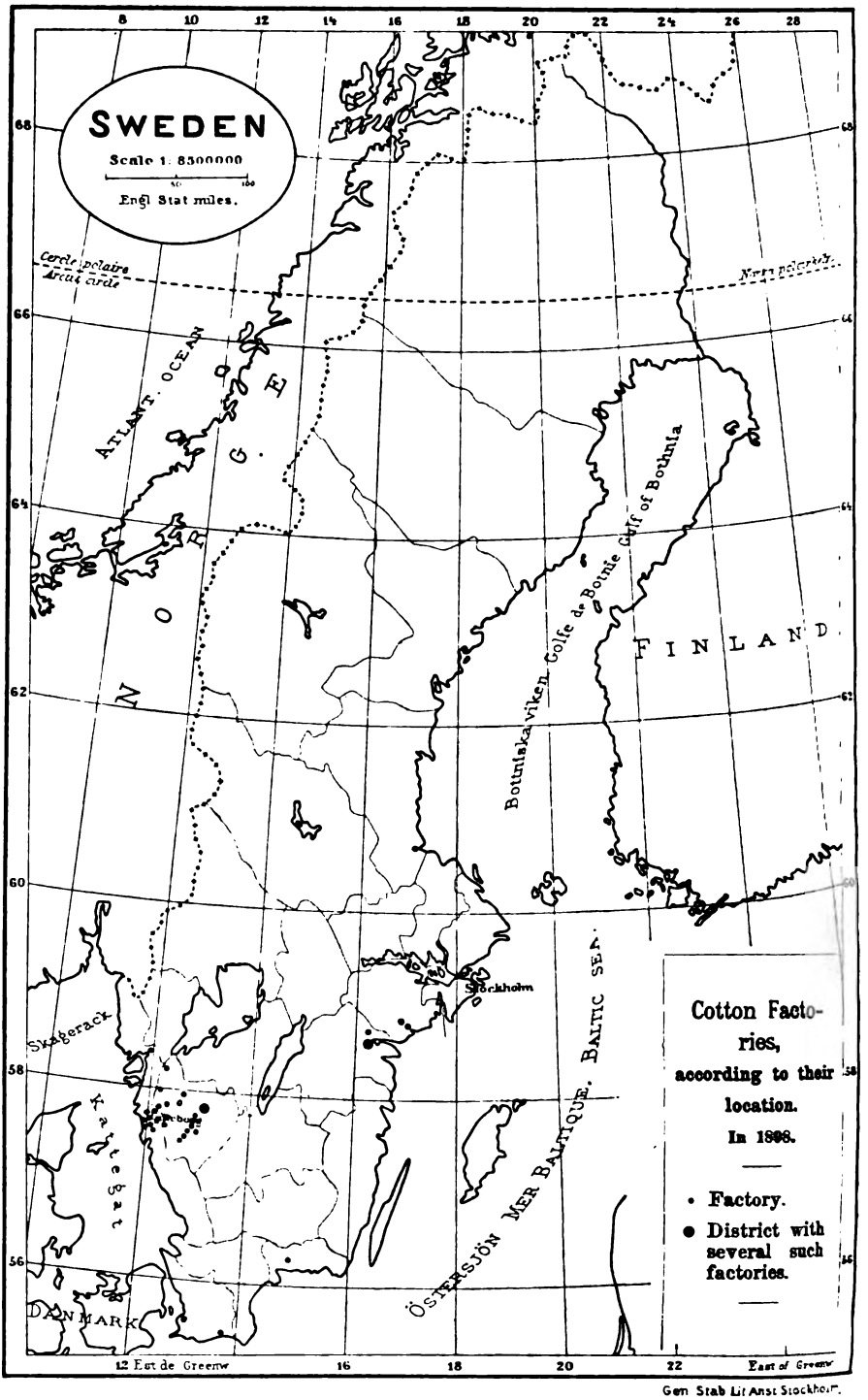

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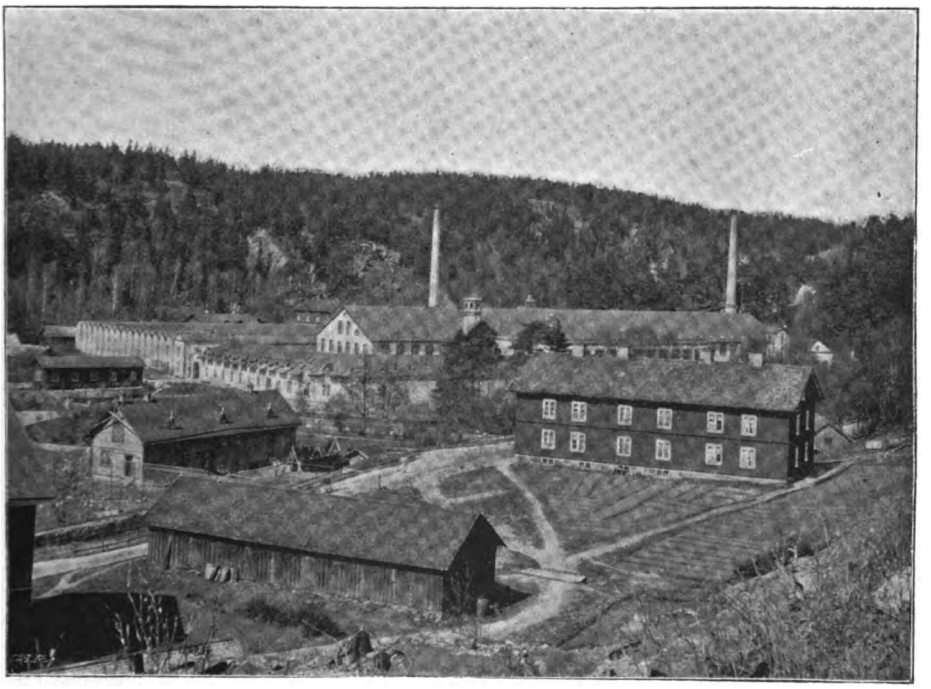
network textures, white as well as coloured, which have already secured a firm footing on the market and are, as far as quality is concerned, fully worthy of comparison with the best obtained from abroad. These goods are, moreover, exported.

What is noticeable within this sphere is the great extension of **domestic handicraft** (hemslöjd) in certain districts, almost amounting to a home industry. Such is the case more especially in the Län of Elfsborg, viz. in the neighbourhood of Borås and Ulricehamn and in the hundreds of Mark, Kind, and Ås, where the country-people, owing to the bad condition of the soil, has turned from agriculture to weaving. Here, the former extensive cultivation of flax and the linen industry have completely yielded to cotton-weaving. The rich peasants are the suppliers, i. e. they supply the yarn on credit to their dependents, who carry on weaving in their homes and afterwards sell to the suppliers. Both Jacquard and other tapestries, as more particularly linen and twill, undyed and dyed stuffs, are the object of this home industry, to which about a quarter of all our manufacture of cotton stuffs must be attributed. The goods are strong, good, and cheap, but they are often wanting in finish. A certain distribution of labour with respect to different sorts of weaving is introduced, so that in some parts of the country only dress materials are woven, in others domestic and other white linens, in others again huckaback, carpets, curtain stuffs, etc., also from other raw material than cotton. As the suppliers, in order to be in a position to compete with the large factories, are obliged to pay very low prices to the weavers, the financial position of the latter is bad; and although several members of a poor family can by this system of work manage to exist, it has, however, its very dark sides.



Viskafors Cotton Spinning and Weaving-Mills.

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Printed cotton goods are manufactured at a few factories, among which *Rydboholm* on the Viskaån River, in the Elfsborg Län, is the principal. Cotton prints, cretonnes, etc., of recognized good quality are produced here, although with regard to richness of choice in patterns they cannot compete with those from abroad, as the expensive printing-rollers are not manufactured in the country.

The Linen and Jute-cloth industry.

The Norrland provinces Helsingland, Ångermanland, and Jemtland, are renowned in Sweden for their excellent flax and fine linen. Nevertheless, Småland, Halland, and Vestergötland also occupy an important place in this respect. In the middle of the nineteenth century, much was done both by the Government and the Riksdag, as well as by private individuals, for promoting the linen industry. Especially noticeable is the bonus introduced in 1740, according to which linen of a certain fineness (there were 8 classes of such) were rewarded, and consequently the manufacturing skill was raised to a high pitch of perfection. Already in 1741, *D. Kropp* obtained privileges on establishing a linen manufactory at Hernösand, in Ångermanland.

The *retting* of the flax takes place in the northern parts of the country in pools of still water; in the southern parts, on the other hand, on meadows — then called dew-retting. The Norrland flax usually assumes a light grey, nearly white colour; that from the southern parts, e. g. Småland, becomes grey and more uneven in colour. The culture of flax has more and more declined. In 1875, 36,490 quintals (à 1·97 cwts.) were gathered, in 1901, only 13,280 — a reduction of 64 %. Our linen trade worked on a large scale has, however, at the same time somewhat increased, very large quantities of flax being imported. The home manufacture is far from sufficient, though, to supply the needs of the country.

Among the present flax-mills in Sweden mention may be made of *Almedal*, *Jonsered*, and *Holma* (Tidaholm), with a total produce value of nearly 2 million kronor in yarn and stuffs. The reason why the linen trade, notwithstanding the fact that flax of splendid quality can be produced in Sweden, is of subordinate significance, must be sought partly in increasing popularity of cotton stuffs, partly and more especially in the difficulty of obtaining sufficient raw material of even quality. The country people do not carry on the retting in a rational way, the sorting of the flax purchased by the factory proves difficult to effect, and the product thus becomes very uneven. At present, attempts are being made in Helsingland at a *systematic* retting of the flax, based on purchasing raw flax from the peasantry, and carried out in connection with a thorough improvement into yarn and linen-cloth.

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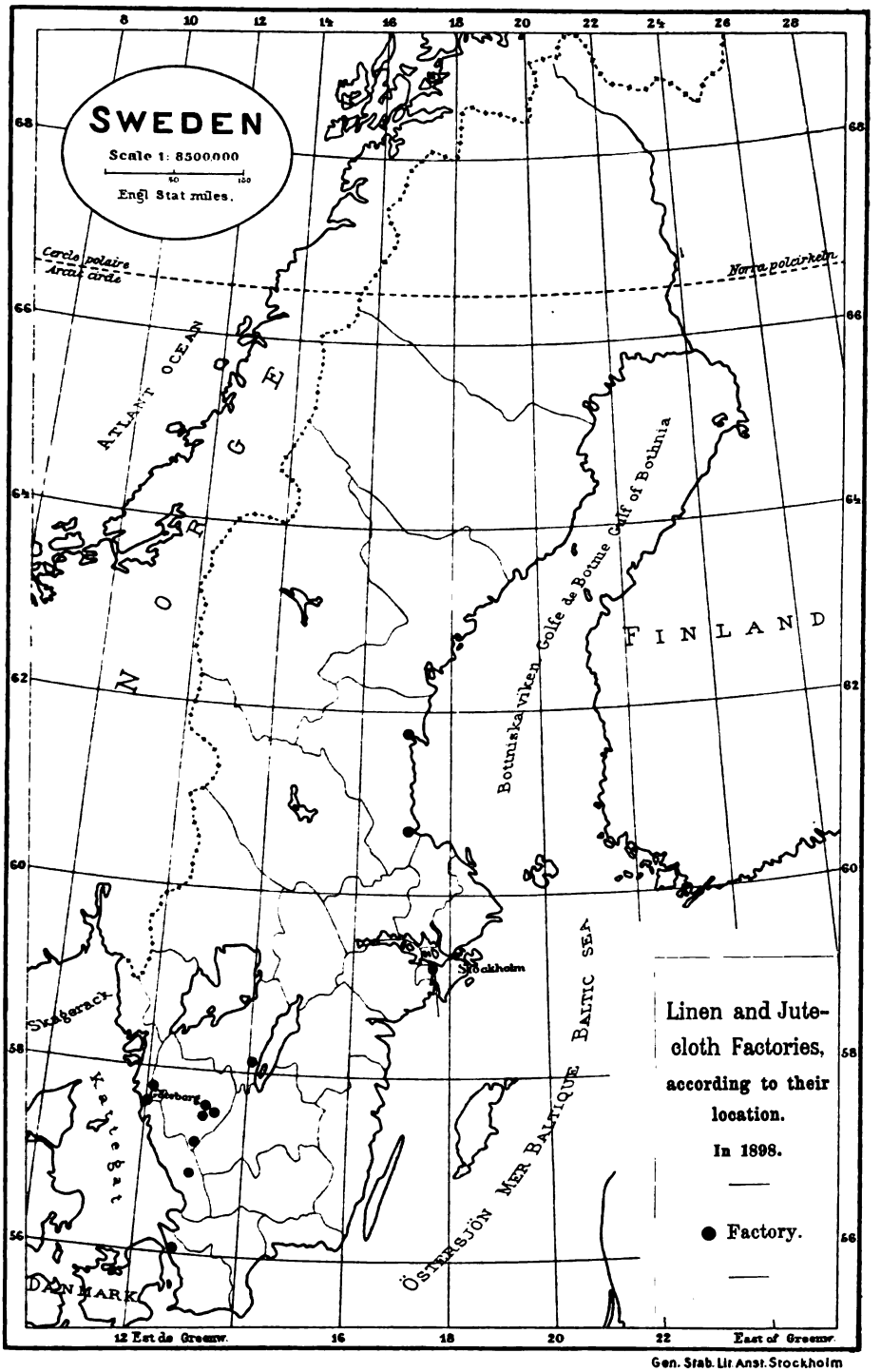

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TABLE. 124. *Imports and exports of Flax and hemp, and articles of manufacture made from them.* In quintals à 1·97 cwts.

Averages for the years	Flax.		Hemp.		Yarn and thread of flax and hemp.		Linen and hemp cloth.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1861/65	2,304	34	17,112	27	194	1	1,366	94
1866/70	3,544	576	16,644	17	432	5	2,433	339
1871/75	4,399	485	19,445	38	1,159	6	5,395	587
1876/80	5,470	147	16,023	61	1,209	3	3,295	504
1881/85	5,140	27	15,992	208	1,596	27	3,548	463
1886/90	5,845	4	16,797	139	1,489	1	2,984	358
1891/95	7,256	—	18,681	130	1,660	1	3,933	211
1896/00	6,622	—	22,472	—	3,000	1	5,891	108
In 1900	3,817	—	21,732	—	2,660	—	5,839	84

Jute (*Corchorus capsularis*), a raw material of this class, has of late years become the subject of a rapidly developed and splendid trade. the representatives of which are *Skandinaviska Jutespinneri- och väfveri-aktiebolaget* (Jute factory) at Oskarström, and *Svenska Juteväfveri-aktiebolaget*, Södertelge. These manufactures have an exceedingly varied employment, as comprehending jute-yarn, netting yarn, mat warp, string, rope, etc., and sacking, packing, mattress and decoration-cloth, saddle-girths, and mats. Jute is also used in certain factories together with wool or cotton for curtain and furniture cloths as well as mats.

The value of **manufacture** at our flax and hemp spinning-mills was, in 1900, 1·61 million kronor, and at the weaving-mills, 1·98 million; at the jute spinning-mills 3·16 million kronor, and at the weaving-mills 3·36 million.

The **imports** of linen and hemp goods are, with respect to the quantities, evident from Table 124. Flax for 0·39 million kronor was imported in 1900, hemp for 1·13 million, hards for 0·24 million, jute for 1·32 million, yarn and thread for 0·66 million, and cloths of flax, hemp, and jute for 2·46 million; total 6·20 million kronor. (A krona = 1·10 shilling or 0·268 dollar).

Certain **other fibrous materials** have been used for cloth, although more by way of experiment. Special mention may be made of Prof. *H. v. Post* in 1860 having attempted to produce yarn and cloth from *the down of plants*, i. e. seedcatkins of willows and osiers (Salix), also of aspens and poplars (Populus), especially the down of Salix pentandra.

Another raw material made into home-manufactured cloth by the peasantry in certain places, is the *nettle* (Urtica dioica), which is treated like the flax, and produces a particularly good, strong, and long fiber. The cloths produced by this means compete in quality with linen goods.

Of late years, attempts have been made in Sweden to employ *peat-fiber* for the manufacture of cloth (i. e. the stalk and root fibers of certain species of Eriophorum), either alone or spun up together with wool. The fiber is generally got as a by-product in the process of making peat-coal. Such cloth has been manufactured at the *Sahlström* Manufactory in Jönköping, and the yarn spun with about 40 % of fiber and 60 % of sheep's wool. The cloths which have cotton in their warp and fiber-yarn in their woof are fulled. This manufacture has not, however, led to any practical result, probably from want of perfectly satisfactory fiber, and the special machinery necessary for cleansing and spinning.

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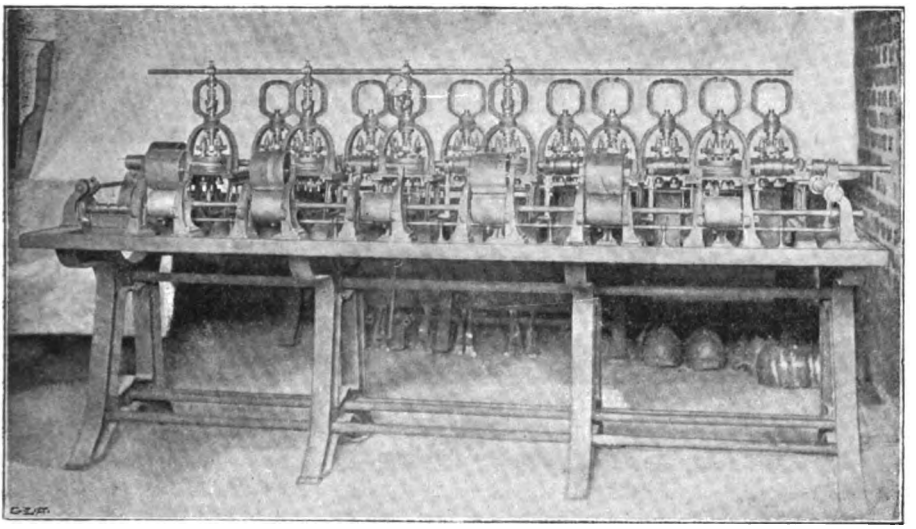
The Silk Industry.

The Swedish silk industry, at present of exceedingly unimportant extent, ought to be regarded as a relic from the time when the people and the ruling princes always regarded it as essential to a country's welfare to introduce and encourage every industry at any price, whether it had any probability of flourishing in that country or no.

By the middle of the seventeenth century, there was a silk manufactory with 50 looms in Stockholm, and in 1673 *Jurgen Enhorn* from Hamburg obtained leave to set up a silk manufactory in Gothenburg or Landskrona, where plush, velvet, and silk ribbons might also be manufactured. The sale was bad in consequence of the import, on account of which all such was forbidden in 1683, and a special silk-house established under government control, all silk stuffs having to be furnished with its stamp and seal. The silk was brought from Persia and other places in Asia, also from Southern Europe. After the long wars of Charles XII, the silk trade led a languishing life, but recovered again under the eighteenth century's ardent system of protection and bonuses.



Strehlenert's Machine for Spinning Artificial Silk.

In the middle of this last named century, many attempts were made to introduce the **cultivation of silkworms** into Sweden. In 1750, there were for this purpose something like 100,000 white mulberry trees to be seen in Lund, native silk was actually produced in spite of the northern latitude, and the State supported the project with bonuses and grants, in the hope that it might call into being a new native industry. In 1830, a »Society for promoting the rearing of native silk worms» was established, under the patronage of the then Crown Princess Josephine, and with illustrious men of science, such as Berzelius, Sven Nilsson, and many others, as members. The production of silk was, however, never especially large, possibly 10 or 12 kilograms per annum; and more particularly after the yearly Government subvention of 4,000 kronor was withdrawn in 1876, one may safely state that this undertaking lost all significance as far as Swedish trade was con-

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cerned. The attempts made by this Society seem, however, to demonstrate that the so-called oak silk-worm (*Bombyx Yama-Mai*), a Japanese species, can thrive exceedingly well in this country. The Society ceased its activity in 1898, after nearly 70 years' work without practical results. The last year's harvest (about 2 kilograms) was obtained at the Society's institution at Alnarp in Skåne.

Although, in 1845, there were 18 **silk manufactories** working, at present Sweden has only 2, viz., *K. A. Almgren* (established 1834), and *Casparsson & Schmidt* (established 1804), both in Stockholm. These factories certainly produce excellent simple silk stuffs (taffety, gros, croisé, rep, satinet, and a certain amount of damask) for wearing apparel, handkerchiefs, ribbons, and neck-ties. Notwithstanding the high duty on imported silk goods (8 kronor per kilogram, whereas the raw silk is admitted duty free), this industry continues to decline. Silk goods are fancy articles, thus, often subject to fluctuations, and therefore are hardly likely to be manufactured at a pecuniary profit in so small a country as Sweden. Our silks of home manufacture will cost 50 % more than the French, and the former are inferior to the latter with regard to colour, though possibly somewhat superior as to durability.

Especially interesting are the attempts that have been made in Sweden to produce the so-called **artificial silk**, or collodium thread. This method, invented by Count *Chardonnet* in Lyons, consists in pressing fine threads out of a gelatinized solution of cellulose (cotton, straw, or chemical wood-pulp) by extremely delicate holes in glass tubes; this thread is in quality very much like natural silk. The ingenious spinning apparatus (patented in many countries) invented by a Swedish engineer, named *R. Strehlenert*, whereby many defects in the original method have been remedied, ought to be of great importance in this manufacture. Still, hereunto belonging inventions have not yet in our country given rise to any industry, but may be said to rank as yet within the domains of experiment. The fabrics, which have up to now been manufactured of this material, have consisted of natural silk in warp and celluloid silk in woof, the latter as to durability being inferior to the former. Such silk has also been manufactured in Sweden of *sulphite composition*, presumably for the first time in any country. This silk, however, becomes yellowish, and is difficult to bleach.

Sweden's **imports** of pure and cotton-silk fabrics has in yearly averages for the five-year periods 1871/1900 been estimated at respectively 2·78, 2·90, 3·44, 4·73, 3·16, and 4·66 million kronor. Of the sum for 1900, amounting to 4·92 million, 2·36 million came on pure silk and 2·56 million on cotton silk. To this may be added 1·20 million kronor for the imports of raw silk.

Other manufactures of the clothing industry.

Of the large number of hereunto belonging manufactures there are several which chiefly fall within the domains of handicraft and home-manufacture, and the manufacturing industry, properly so called, has, in this branch, on the whole only made its first entry into this country. This is due to the smallness of the home-market and the obstacles for an export on a large scale. On the contrary, our country is reduced to the necessity of a considerable **import** from countries which in this respect are leading. The whole value of this import amounted in 1900 to 14·86 million kronor. The largest items were *ribbons* (silk, and others) for altogether 1·95 million kronor, *embroidered works* for 1·73 million kronor, *hats* for 1·81 million, *clothes* and clothing-articles for 3·70 million, including household articles of all kinds, such as table-linen, etc.; further *lace-works* for 0·41 million kronor, *lace* for 0·42 million, *stockings* for 0·66 million, *thread-gloves* for 0·49 million, *waterproof stuffs* for 2·93 million kronor, etc.

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The branches which in 1900 accounted for the largest **manufacture** are the following:

	Factories.	Workmen.	Value of production.
Stockinet factories and hosieries	51	3,298	7,406,000 kronor.
Sewing factories	27	2,134	5,698,000 »
Factories for calendered fabrics	190	2,335	5,301,000 »
Hat factories	16	1,234	2,934,000 »
Curtain factories	3	343	1,454,000 »
Ribbon factories	12	398	1,098,000 »
Factories for waterproof stuffs	13	278	1,068,000 »
Neck-tie factories	12	330	760,000 »
Corset factories	7	458	717,000 »
Umbrella and parasol factories	7	51	533,000 »
Cotton-wool factories	14	230	501,000 »

Of **dye** and **bleach works** for yarn and cloths we have a large number but mostly small; still there are some which work on a larger scale; the most important are the dye-works of *Levanten*, near Gothenburg. At the large wool and cotton factories there are also dye and bleach-works established, quite satisfying the most exigent claims of the time in this branch.

Of our **stockinet-factories** the largest are to be found in the Elfsborg, Göteborg och Bohus, and Östergötland Läns, as well as in Stockholm and Karlstad.

The most important **sewing-factories** are the cloak-factory of *Wettergren & Co.* in Gothenburg and *Aktiebolaget* (i. e. joint-stock company) *Moresco* in Malmö.

Hats are manufactured in Sweden principally of felting. The most important factories of this kind are to be met with in Halmstad (*Wallbergska fabriken*), in Karlskrona, and in Stockholm.

Machines used in the textile industry.

Of the large number of *machines* used in the textile industry, only a small number are manufactured in this country, although, for instance, the manufacture of ordinary machine-looms for simple cotton cloths has several conditions for being carried on profitably here. The *Huskvarna factory* makes *sewing* and *knitting machines* of recognized good quality. *P. Persson's counting apparatus* with the pattern discs pertaining thereto has proved of great importance, especially in home handicraft, whereby the work is facilitated in the manufacture of a large number of articles of clothing by the ordinary knitting machine. For *dyeing*, bleaching, and washing cotton, likewise within the domain of calico-printing, *G. Jagenburg* at Rydboholm has made several important inventions, and there are several good inventions of Swedish origin for impregnating cloth for the purpose of rendering it waterproof or less likely to catch fire. *E. Schenson's* Swingle apparatus for treating flax, and *R. Strehlenert's* arrangement for spinning artificial silk, may also be mentioned; for the latter see p. 808. Electricity also has been utilized, as in *G. Wenström's* method of singeing-machines for cotton cloth, and *G. Cassel's* arrangement of cutting-machines. Weavers' reeds are manufactured at the *Mora* factory.

For exercising control over the textile industry in Sweden, as well for the needs of the individual as those of the State, the *Technical High School's Material Testing Institution* has a special department furnished with the requisite apparatus for the purpose. Besides microscopic examinations of the fiber contained in yarn and cloth, tests of different kinds as to strength of material are applied. Thus, yarn is tested as to strength, elasticity, evenness, purity, and uniformity, the quality of string and fiber; cloth is tested as to strength, elasticity, durability, perviousness to gases and fluids, permanence of dyes, shrinkage. Even separate fibers are examined with regard to strength and spinning qualities. For these various purposes there are up-to-date apparatuses, partly constructed specially for the Institution.

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3. HIDES, SKINS, AND HAIR.

The official statistics make a distinction as follows between several different manufactures under this general heading, the figures being those for 1900 (a krona = 1·10 shilling = 0·268 dollar):

	Factories.	Workmen.	Value of production.
Tanneries	521	2,379	11,060,000 kronor.
Fur-goods factories	16	546	2,526,000 »
Shammy-leather factories	3	28	76,000 »
Total A	540	2,953	13,662,000 kronor.
Shoe factories	39	2,815	9,809,000 kronor.
Glove factories	20	596	1,012,000 »
Other factories	24	509	1,683,000 »
Total B	83	3,920	12,504,000 kronor.
Grand total	**623**	**6,873**	**26,166,000** kronor.

Class A, as will be seen, includes the industries of working up or dressing the raw materials (leather, hides), while class B embraces manufactures of those commodities when worked up or dressed.

The import of these commodities is much greater than the **export**. Between 1870 and 1880, there were imported *raw materials* to a value of 14·21 million kronor annually, between 1880 and 1890, of 16·51 million kronor, between 1890 and 1895, of 18·42 million kronor, and between 1895 and 1900, of 23·20 million kronor. The trade returns under this heading are, however, in excess of those for labour, inasmuch as the former also include, for instance, fertilizers. The export has been as much as 1 or 2 million kronor annually, but since 1890 has risen to 3 or 5 million kronor. — Of *goods manufactured*, both imports and exports are inconsiderable. The imports have been about 3 million kronor during the last few years, while the exports have never reached 1 million.

Tanneries.

The tanning of hides and skins is generally effected by means of substances containing *tannic acid*, which enters into combination with the glutinous ingredient in the raw hide, and both prevents this from being decomposed and protects the actual fibers in the hide from being destroyed. This is **bark-tanning**. The tannic acid required in this process is found in many plants and in different parts of various plants, for instance: the bark, leaves, fruit, oak-apples, wood etc. In Sweden *the bark of the oak* has long been the chief source of the acid for tanning; the bark of the spruce and the pine can also be used, though it contains less of the acid. Tanning by means of water and bark takes a long time, thick sole-leather requiring even years, since it is an exceedingly long process for the acid to penetrate into the lower

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TABLE 125. *Imports and exports of Hides and Skins.*[2]

Averages for the years	Leather. Quintals.		Other dressed[1] Hides & Skins. Quintals.		Undressed Hides. Quintals.		Fur-goods. Value in thousands of Kronor.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
1861/65	1,386	11	315	29	25,342	2,540	.	.
1866/70	1,879	202	357	9	23,229	6,119	.	.
1871/75	6,426	295	1,044	18	36,595	6,737	669	141
1876/80	15,007	938	1,472	70	20,227	8,860	504	119
1881/85	20,256	818	2,044	40	24,648	13,779	700	82
1886/90	20,178	355	2,678	48	28,848	17,982	1,159	128
1891/95	24,613	1,047	4,427	105	30,756	20,171	1,652	534
1896/00	25,720	61	6,955	142	46,385	35,264	2,575	445
In 1900	17,330	39	4,909	102	50,502	48,335	2,542	200

strata of the leather. Consequently, although the quality of the leather is considered to be improved by bark-tanning, other agencies have been tried with a view of hastening the process; the chief of these are certain *extracts* containing a large percentage of tannic acid; if they are employed with water, a very much more effective solution is obtained. Attempts have also been made to accelerate the absorption of the tanning agent by passing an electric current through the leather and the tanning solution.

Besides bark-tanning there are other methods: **tawing,** in which advantage is taken of the property of *alum salts* to enter into a protective combination, just like tannic acid, with the gelatinous ingredient in hides; tawing is employed specially for glove-skins; further **shammy or oil-tawing;** in this process *fat* or *train-oil* is the tanning agent; the shammy leather resulting is much prized on account of its soft woollike texture especially for gloves, riding breeches, jackets, etc. – Tanning is carried on in many places as a handiwork, and hence the real number of tanneries is far greater than the figure given on p. 810.

Tanning is among the industries that in our country have had the greatest struggle to keep pace with the changes having occurred in modern times in the conditions of industry. New methods and machines do not appear to have been introduced to any great extent. In 1871/75, the annual turnout of sole-leather and insole-leather was estimated at a value of nearly 5 million kronor; in 1886/90, this figure had gone down to little more than 1 1/2 million kronor. Since that time, there has been another rise (perhaps partly due to more accurate data), the turnout for 1900 being worth 6·42 million kronor. The turnout of other kinds of leather has kept up better, a tolerably even increase being noticeable through the last thirty years, from 2 million to 4 million kronor. In quantity the turnout in 1900 was 28,160 quintals of sole and insole leather and 15,683 quintals of other kinds. The largest tannery is *Lundin's* in Stockholm; otherwise Malmö, Sölvesborg, Gefle, Lund, Simrishamn, and Landskrona seem to be the main centers of the leather industry. — In Table 125 will be found the amounts of imported and exported leather, etc. Undressed hides are imported

[1] Not referable to furs. — [2] A quintal = 1·97 cwts. A krona = 1·10 shilling.

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chiefly from Germany and Denmark, dressed ones from Denmark, England, and Germany. The value of the *imports* in 1900 was estimated at 5·55 million kronor for undressed hides and skins, at 3·12 million kronor for sole and insole leather, and at 2·94 million kronor for other kinds. The *exports*, chiefly to Denmark, England, and Germany, in the same year were given as equal to 4·35 million kronor for undressed hides, while for leather the amount was inappreciable.

Other Manufactures.

Shoes. The wholesale manufacture of shoes is carried on chiefly in Stockholm and in Skåne. The largest factories are in Stockholm: *Beijer's* and *Stockholms Skofabrik* (shoe factory). The import includes superior quality shoes from Denmark and Germany and cheap machine-made ones termed Vienna shoes; the value of the whole import in 1900 was estimated at somewhat less than ½ million kronor. The export varies but has been quite small during the last few years. For the number of workmen and of factories, and for the value of turnout see page 810.

Gloves. Glove manufacture is a Skåne industry of old standing, whence the name *Skåne gloves*. Lambskins and goatskins are used almost exclusively for glove-making. The so-called *gants de Suède* are a special sort of shammy-leather gloves with the flesh-side outermost. Elk, reindeer, and buck-skins are also employed for gloves. The chief seat of the glove-making industry in Sweden is Malmö. The number of factories and workmen and the value of the turnout are stated on page 810. The total turnout in 1900 is stated as having been 723,006 pairs. — In 1900, the import of gloves was estimated as equal to 0·42 million kronor, while the export was only about 1/7 of that amount.

Other allied branches of industry are: the *manufacture of fur-goods*, for which see page 810 and Table 125; the *making of saddlers' wares*, which is, as a rule, carried on as a handiwork, etc.

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4. OILS, TAR, INDIA-RUBBER, AND KINDRED COMMODITIES.

In this section, a distinction is made between the industries concerned in the production of the raw material and those which work that raw material up. The totals in the year 1900 may be summarized as follows:

	Factories.	Workmen.	Value of production.
Production of Raw Material.....	110	576	7,984,000 kronor.
Manufacturing Industries.....	77	1,858	13,121,000 »
Total	187	2,434	21,105,000 kronor.

Of these commodities, too, it is necessary for Sweden to import considerable quantities, the export being of very little account. The

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chief import is petroleum, in 1900 for 10·6 million kronor. Then come fatty oils (7·8 million) and oil cake (5·4 million); for these see below. The chief exports are tar, though the amount now is far less than formerly, stearine, also galoshes and other india-rubber goods — these being new articles of export during the last few years. The total exports under this heading in 1900 did not exceed 1·82 million kronor.[2]

Fatty Oils.

Of fatty oils the only ones Sweden produces on a large scale are: **linseed-oil, rape-oil, fish-oil,** and **train-oil.** The two first named are derived from the corresponding seeds by means of pressure or extraction. The leavings, after the process of pressing or extraction is completed, are used, in the form of oil-cake, or in the form of a powder, as a kind of fodder for cattle. Fish-oil is produced by heating herrings till the fatty matter floats to the top, when it is either skimmed off or else removed by pressure. The oil is *refined* to a greater or less extent before it is put upon the market. The remainder of the fish, subsequent to the pressing process, was up to later times converted into herring guano (see below, section: Fertilizers). The amount of fish-oil produced in one season is dependant on the herring fishery, which, as known, varies a great deal. — At some factories **train-oil from seals and whales** is also prepared.

In 1900, the total number of factories under this heading was 14, employing 159 hands; the value of the turnout was 3,847,000 kronor, being 2,279,000 kronor for 44,182 quintals of linseed and rape oil, and 1,446,000 kronor for 117,356 quintals of oil-cake.[3] — Fatty oils are very extensively used in making hard and soft soap, stearine candles, colours, and varnishes. The home manufacture of oils and oil-cake does not nearly cover the needs of the country. The *import* is consequently very considerable, as may be seen below:[2]

Averages.	Linseed and Rape-seed.	Fatty Oils.	Oil cake.	Train-oil.[1]
1871/80.....	1,340,000 kronor.	2,526,000 kronor.	1,168,000 kronor.	
1881/90.....	1,695,000 »	3,746,000 »	2,580,000 »	385,000 kronor.
1891/95.....	2,312,000 »	4,737,000 »	3,279,000 »	516,000 »
1896/00.....	2,718,000 »	7,019,000 »	4,268,000 »	539,000 »
In 1900.....	3,151,000 »	7,806,000 »	5,369,000 »	660,000 »

In greater detail, the import of linseed in 1900 was for 2,967,000 kronor, of rape and colza seed for 183,000 kronor, of linseed, colza, and rape oils for 289,000 kronor, of sweet or olive, hemp, palm, castor, nut oils etc. in barrels for 7,397,000 kronor, and in other vessels for 120,000 kronor. The *export* is tolerably insignificant.

Mineral Oil (Petroleum).

Mineral oil is in general imported in refined form as **kerosene,** but not little is refined in Sweden itself. There are no sources of mineral oil in Sweden, but it was the two brothers *L.* and *R. Nobel*, themselves Swedes, who established the *Russian petroleum industry* on the peninsula of Apscheron in the Caspian Sea. Under their management, this Russian industry has developed to such an extent that it can compete with the American.

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[1] The figure 385,000 is the average for 1886/90. — [2] A krona = 1·10 shilling or 0·268 dollar. — [3] A quintal = 1·97 cwts.

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The value of the *imported* raw mineral oil in 1900 was 330,000 kronor. The amounts of the *imported refined oil*, in annual average for the five-year periods from 1871 to 1900, were 66,707, 113,860, 182,294, 310,484, 449,116, and 622,710 quintals, or per inhabitant 1·5, 2·5, 4·0, 6·5, 9·3, and 12·4 kilograms; in 1900 the amount was 697,589 quintals or 13·6 kilograms per inhabitant. Besides this, there was the import of crude mineral oil, and on the other hand small quantities of refined oil were exported from Sweden. Of the total amount of refined oil imported, about 10 % came from Russia, the rest from America, in part via Denmark and Germany. The price of refined oil, which in 1871/75 was 34 öre per kilogram, went down to 15 öre in 1900.

In this connection it may be mentioned that the manufacture of **machine** and **carriage lubricants** has progressed very considerably during the last few years, and should an invention, made in Sweden quite recently, of using a solidification of wool-fat and petroleum as a machine-oil prove as successful as certain eminent specialists have prophesied, a very important branch of industry may thereby be opened, for in Sweden alone the consumption of machine oil amounts to a value of about 200,000 kronor a year, exclusive of the large quantities of sweet oil and home-made mixtures of tallow and tar that are also made use of.

Glue and Gelatine.

Various parts of animal bodies contain substances, which, if boiled for a considerable time in water, dissolve and yield glue. A technical distinction is made between **leather-glue,** obtained from various refuse matter from hides and sinews, and **bone-glue,** obtained from the bones of animals, which are immersed for the purpose in benzine to remove the fatty portion; the bones are then thoroughly boiled in water under pressure, the glue being thereby set free. The bone-fat, which possesses the soft consistency of lard, is used in the manufacture of hard and soft soaps, stearine candles, etc. **Gelatine** is an almost colourless, tasteless, and odourless glue, prepared with great care, and appearing in a finished state in very thin leaves. The raw material for the manufacture of gelatine consists of the hide of calves' feet and heads; the hide is first subjected to processes for removing the fatty ingredients and the hair. Of fish-glue the principal variety is **isinglass,** which is the dried inner membrane of the air-bladder of a number of sturgeon varieties. In connection with the manufacture of glue may be mentioned that of **roller-composition,** obtained by dissolving glue in glycerine of a given strength, to which is added sugar. The ordinary roller-composition used by printers is blackened with lampblack.

In 1900, there were 13 factories engaged in making glue and gelatine, with 223 hands in their employ, and a turnout value of 1,120,000 kronor. There were also 3 factories producing roller-composition for a value of 18,000 kronor. In the statistics of factories, the figures for the manufacture of glue show an increase; but the same is true of the *import* of that commodity, though not for the last few years; in 1900 it was only 76,000 kronor. To that may be added 24,000 kronor for isinglass and gelatine. The export is insignificant in amount.

Tar and Kindred Substances.

In olden times when the value of the timber was not so great as it is now, **tar-burning** and **pitch boiling** were very customary, especially in the forests of Norrland; at that time, wood-tar was one among the chief exports from our country. Nowadays, tar-distilling is almost entirely confined to the two most

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northerly Läns, where it is carried on as a domestic industry. Figures for the export in recent times are given in the Table on page 667. The manufacture appeared, in the returns for factories of 1900, as only equivalent to 216,000 kronor; that figure does not, however, include the tar prepared by those who only distil it on a small scale as a domestic industry.

About the year 1870, a number of **wood-oil factories** sprang up, the purpose of which was to turn to advantage the stumps of coniferous trees, left behind when the timber is felled and removed. By means of dry distillation, certain products were obtained from these stumps and other pinewood, such as tar, oil of wood-tar, wood-oil, etc. Of these, wood-oil is the most valuable, possessing, as it does, certain of the chemical properties of turpentine oil; it has not, however, proved possible to get rid of the burnt smell attaching to wood-oil, and consequently its production is carried on with but little success. In 1900, there were 6 small establishments manufacturing this commodity.

The manufacture of **coal-tar** is dealt with below, under chemic-technical industries.

Carbolic Acid, Creosote, etc.

From the destillation of coal-tar a number of different products are obtained, among others, several substances which form the basis of the manufacture of **aniline colours,** viz.: benzole and its homologues, aniline, phenol (carbolic acid), naphthaline, anthracene, chinoline, etc. The preparation of colours, artificial medicines, etc. from these substances gives rise to an extensive and profitable industry in some other countries. In Sweden, distillation of coal-tar occurs for the fabrication of only a few products, such as carbolic acid and oils used for the preservation of wood (called carbolineum), naphthaline, asphalt-varnish, and asphalt-tar. That this industry has not made more progress in Sweden than is the case at present, may perhaps be due to the preponderating attention devoted to inorganic chemistry at the expense of organic.

India-Rubber.

India-rubber is manufactured chiefly in three different forms: as pure india-rubber, vulcanized india-rubber, and as ebonite. **Pure india-rubber** is soft and elastic and finds employment in the production of india-rubber sheets, pipes, gloves, etc., chiefly for surgical purposes. **Vulcanized** india-rubber is used, partly by itself, partly with an insertion of a strong woven material, for tubes, tires, straps, etc. **Ebonite** is a kind of india-rubber vulcanized by a special process; it is used for many purposes by reason of its great power of effecting electrical isolation and its property of resisting the action of acids. **Galoshes** consist primarily of a woven material covered with a thin coating of weakly vulcanized guttapercha or india-rubber. The use of india-rubber goods increases year by year; india-rubber galoshes have become a well-nigh indispensable article of wear for a large proportion of the inhabitants of the country, even for those who are not well off. The popularity of bicycling has occasioned a very great consumption of india-rubber tires.

Since 1890, there exist a number of Swedish factories for the manufacture of galoshes, and they have been able to compete successfully with those abroad. Of the ten india-rubber manufactories in the country, the largest are those in *Helsingborg* and at *Svaneholm* near Borås, which also turn out galoshes.

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India-rubber Factory, Helsingborg.

In 1900, the total value of the turnout in this industry was 4,032,000 kronor, 75 % of which fell to the lot of the two factories named. About 1870, the value of the whole output in the india-rubber trade was only some few thousands of kronor. The *import*, both of the raw material and manufactured articles, has also advanced considerably and was estimated in 1900 at 4,669,000 kronor, of which 1,473,000 kronor were for crude india-rubber or guttapercha, 734,000 kronor for tubes, pipes, straps etc., and 2,086,000 kronor for other manufactured articles in the india-rubber trade, — for the most part galoshes. In recent years, there has sprung up a not inconsiderable *export*, estimated in 1900 at a total value of 670,000 kronor; the export goes principally to Norway and Denmark. (A krona = 1·10 shilling or 0·268 dollar).

Hard and soft Soap.

Soap is obtained by the decomposition of different kinds of fat, both solid and fluid, by means of alkalies. Generally speaking, hard soap is soda, soft soap, potash chemically combined with fatty acids to salts. The **boiling of hard soap**, like so many processes, used to be done on a small scale to supply domestic needs; from wood-ashes and lime the required potash ley was obtained, which was boiled with an admixture of tallow. A soft tallow soap was the result, from which by thorough salting with cooking salt a firm and good hard tallow soap was obtained. The first **factory for the making of soft soap** in Sweden was founded in 1823 by *Lars Montén;* he did it in co-operation with the famous chemist Berzelius. Though the raw materials for this industry, especially tallow, linseed oil, and potash, might be obtained, at any rate in part, in the country itself, probably the greater proportion of the raw materials used is brought from abroad, whereby a saving is made, more especially since a variety of oils obtained from tropical plants, such as cocoa-nut and palm oil etc., have begun to be used in soap-making. Soft soap used to be generally employed in washing, but has latterly been superseded by hard soap, the manufacture of which has been cheapened by the partial employment of resin (colophony) in place of fat. For toilet soaps, *cocoanut-oil* is primarily made use of. Soaps have also been recently manufactured prepared by taking as neutral a soap as possible for a foundation, grinding it to a powder, perfuming it, and pressing it. Besides other good qualities possessed by soaps prepared by this method, they also admit of being *scented* better and more lastingly than others.

The manufacture of both hard and soft soap has made great strides during the last 20 years in Sweden; it must have at least doubled in amount during that time. The export has decreased slightly, while the consumption in the country has more than doubled. It may also be mentioned that though soft soap still exceeds hard soap in quantity of production, it is principally the manufacture of the latter that has grown. The soap imported is chiefly of the choicest scented quality, though the best Swedish soap-works nowadays are able to produce excellent samples of that type, too.

In 1900, 129,412 quintals of soft soap, and 36,598 quintals of hard soap were made in Sweden. (A quintal = 1·97 cwts.). Stockholm occupies the fore-

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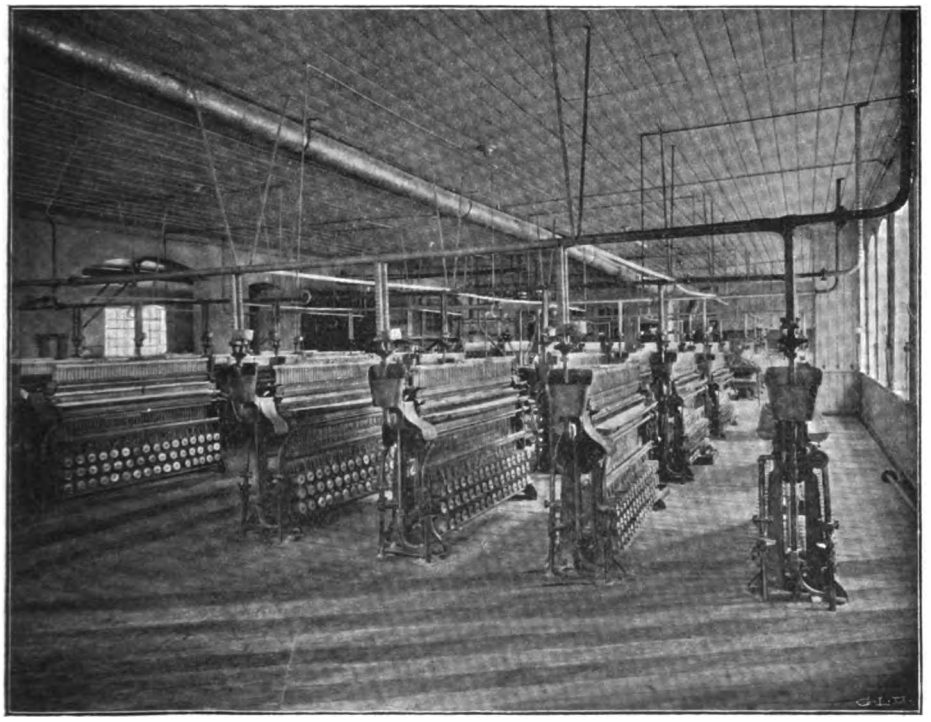
most position in this industry, with 10 factories (of a total of 42) and over 43 % of the whole production, which is estimated as equal to 5,894,000 kronor (à 1·10 shilling or 0·268 dollar); then comes Malmö with 8 factories and 17 % of the total turnout.

Scents.

Scents in the ordinary sense are most frequently solutions of fragrant substances in pure spirit. In general, scents and the choicer soaps are made in the same factories. The whole turnout of scent was valued at 756,000 kronor in 1900. The imports in 1900 were valued at 124,000 kronor, and the exports at 25,000 kronor.

Candles.

Up to about the year 1860, **tallow candles** were almost the only kind of artificial light, for though colza-oil lamps attained a certain degree of popularity, the tallow candles dipped in the homes were and remained indispensable in every household, until the time when gas and American paraffine almost simultaneously became known and put into use as illuminants. In place of tallow candles, **stearine candles** are now almost universally employed, in cases where for some reason candle light is preferable. The manufacture of stearine candles in Sweden dates from 1838, when *L. J. Hierta*, a prominent and active man in



Liljeholmen Stearine-Factory. Candle-Moulding Room.

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many directions, in conjunction with *J. Michaëlson* established the factory at *Liljeholmen*. In 1843, *Lars Montén* founded the Clara candle-factory, the second of the kind in the country. In 1900, there existed three stearine candle factories, employing 312 hands and turning out 23,857 quintals of candles, at the calculated value of 2,391,000 kronor. The imports of candles were 70,000 kronor, the export barely 4,000 kronor.

In the manufacture of stearine candles, certain fatty substances are used for raw material, such as tallow and various oils consisting of a mixture of fluid fat, oleine, and more or less solid fats, as palmitine and stearine. In the manufacture of candles, these so-called *neutral fats* are decomposed by the action of some weak acid into glycerine and oleic, palmitic, and stearic acids respectively. *Oleic acid* is fluid at ordinary temperatures, *palmitic* and *stearic acids*, on the other hand, are solid, and, after due cleansing, these are employed in the moulding of candles. The by-products in candle-making, glycerine and oleic acid, are preserved and purified separately. *Glycerine* is made use of in a large variety of ways, for instance as a superior kind of lubricant, as a medical agent, and, first and foremost, as an ingredient in nitroglycerine. Oleic acid, in trading incorrectly termed *oleine*, is employed both in the manufacture of hard and soft soap and as a dressing agent in the textile industry.

Other Manufactures.

Of such, **varnish** is the only one that requires to be mentioned here. There were, in 1900, 15 factories for the production of varnish in Sweden. The number of hands employed was 91 and the value of the turnout was calculated at 993,000 kronor. In 1900, the import of varnish was worth 237,000 kronor, 13·5 % of the amount being spirit varnish. The exports only amounted to 54,000 kronor, the percentage of spirit varnish being about the same as above for the imports.

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5. TIMBER-WARE INDUSTRY.

Of this important industry, the most extensive of any pursued in Sweden, the branch concerning the production of non-manufactured wooden goods has been treated of above under the heading: Forest Industries. The number of centers in that branch of timber-ware industry, in 1900, was 1,148, employing 43,312 hands and with a turnout valued at 163 million kronor. An account now remains to be given of the manufacture of **finished articles of wood,** and this, too, is one of the most considerable of Swedish industries; in 1900, there were 555 factories concerned in it, with a staff of 25,121 hands, the result of whose labour was valued at 68 million kronor. It should be noted that matchmaking is included in these figures, as is customary in Swedish Statistics; that branch might of course equally well be referred to the chemical industries.

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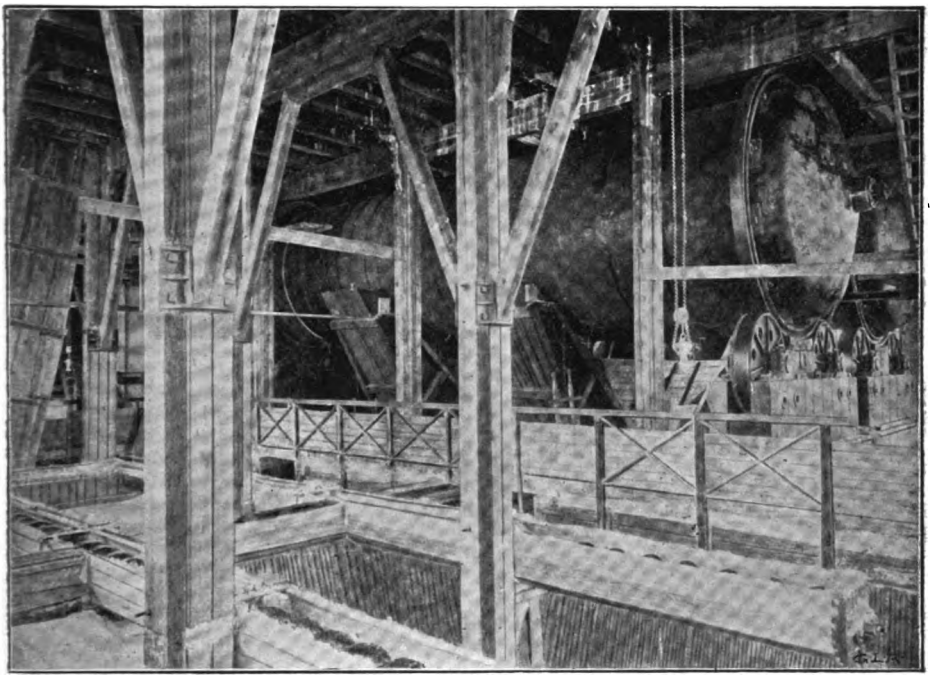
In Table 86, on page 639, will be found the figures for the **exports and imports** of manufactured wooden goods. As will be seen, the export trade is increasing in a very gratifying manner, primarily due to the rapid development of the wood-pulp industry.

Wood-Pulp Manufacture.

Wood-pulp may be fairly called one of the natural products of the country of Sweden, owing to the vast supply of timber suited to its production and the great storage of power in the numerous waterfalls. Sweden has, moreover, taken a leading part in the development of the industry, more especially by the invention and application of a number of improved and simplified methods of manufacture.



Wood-pulp Factory. Boilers.

The first wood-grinding mill in Sweden for the manufacture of wood-pulp **by mechanical processes** was established in 1857 at Trollhättan; the method employed was that first practically adopted by Völter in 1846. This method consists in grinding unsteeped blocks of wood with their ends facing sandstones that revolve round a horizontal axle, both stones and blocks being kept continually moist with water. The wood-grinding mills established in recent years have the grind-

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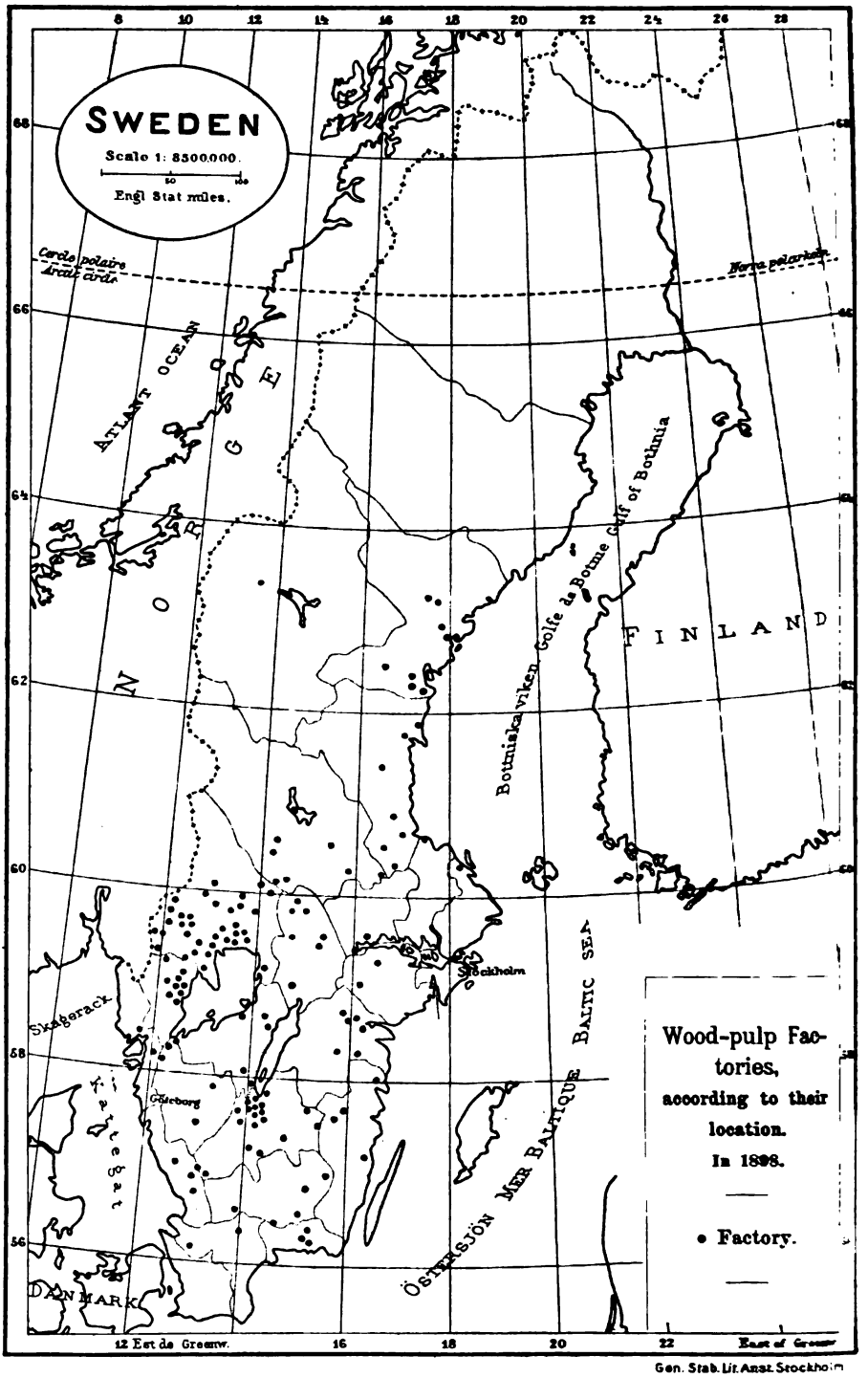

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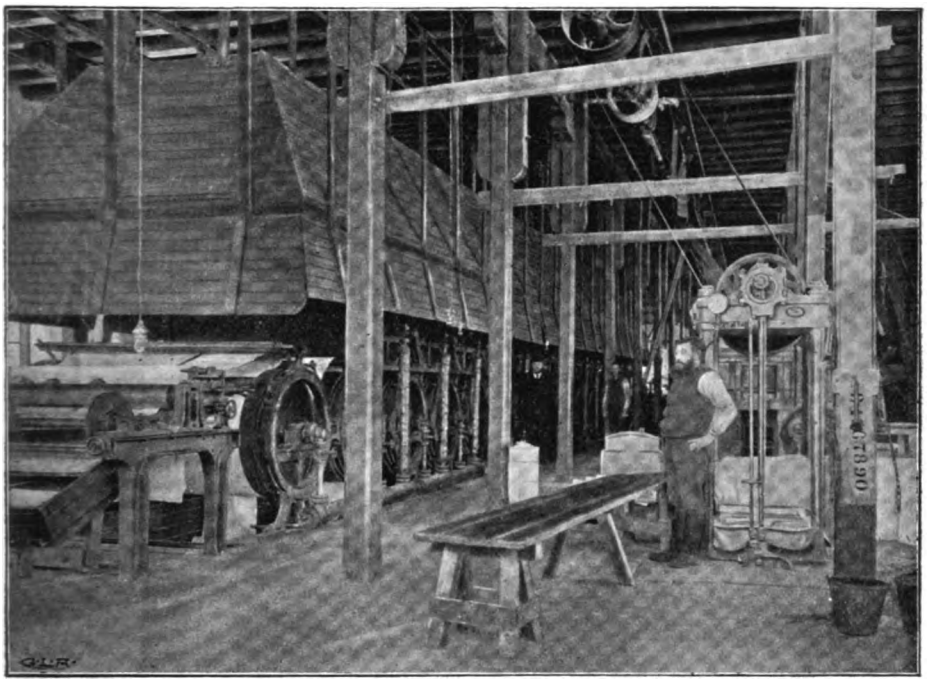
stones in a horizontal position, the blocks of wood being brought into contact with them by hydraulic pressure. A variation in this method of rough grinding consists in first steeping the blocks of wood in water, whereby some of the incrusting substances are set free; that gives the pulp a stronger and tougher consistency, but also a darker colour, as subsequent to steeping it does not admit of bleaching.



Wood-pulp Factory. Drying Cylinders.

Chemical Wood-pulp was first manufactured on a large scale in America from 1862 onwards. The first manufactory in Sweden was probably *Delary* in the Kronoberg Län, established in 1871. Best suited for wood-pulp prepared by chemical processes is the wood of the aspen tree and the spruce; the pine can also be used, but it yields a less pliable fiber. In general, one of two methods is employed: the **soda process** and the **sulphite process.** The former is the older, and a slight modification of it is the *sulphate process*, in which the loss of soda during the manufacture is compensated for by sodium sulphate as being cheaper than soda. The sulphite process, first suggested in 1866 by Tilghmann, an American, in 1874 became a dangerous rival of the soda process, inasmuch as at that date E. Mitscherlich, a German, and D. Francke and C. D. Ekman, Swedes, introduced the process in the wholesale industry almost simultaneously. The two first named used

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calcium bisulphite, the third magnesium bisulphite. The cellulose produced by *Ekman's process* is remarkable for its extraordinary purity and gloss, which render it possible to make use of it for superfine paper without further addition; in the manufacture, however, it is rather more expensive than ordinary sulphite cellulose.

Wood-pulp from Scandinavia is considered superior to that from Germany; this is due to the fact that the varieties of wood used for this purpose in Germany contain more resin, and that makes the paper made from the pulp assume a darker colour. In regard to the quality of *cellulose*, Sweden stands first among all countries producing it.

The development of the Swedish wood-pulp manufacture since 1871 may be seen from the following figures[1]:

Averages.	Mills.	Workmen.	Production.	Exports.	
			Quintals.	Quintals.	Value in Kronor.
1871/75	19	900	63,499	46,570	1,095,568
1876/80	24	927	116,631	73,094	1,719,560
1881/85	32	1,343	234,670	109,795	1,971,552
1886/90	57	2,765	620,809	418,536	5,050,678
1891/95	87	4,152	1,534,525	1,061,531	10,216,534
1896/00	123	6,058	3,351,781	1,977,796	18,830,194
In 1900	122	6,910	4,168,769	2,285,427	26,727,787

The production and exports in 1900 of the four varieties of wood-pulp manufactured were as follows:

Wood-pulp.		Production.	Exports.	Value per Quintal.	Total value of Exports.
		Quintals.	Quintals.	Kronor.	Kronor.
Chemically produced,	Dry	1,551,511	1,328,807	15·00	19,932,105
» »	Moist	666,536	104,256	7·50	781,918
Mechanically »	Dry	544,703	484,028	9·00	4,356,251
» »	Moist	1,406,019	368,336	4·50	1,657,513
	Total	**4,168,769**	**2,285,427**	—	**26,727,787**

Wood-pulp chemically prepared has grown in bulk both in the figures for manufacture and exports. In 1900, 63 % of the wood-pulp exported was of chemical preparation, and in value it was 77·5 % of the whole.

Almost all the Läns in Sweden are engaged more or less in the wood-pulp industry, the chief, however, are Vermland, Gefleborg, Vesternorrland, Elfsborg, and Jönköping, with ²/₃ of the whole in value. The exports to England are about 60 % of the whole; other countries supplied are Belgium, Denmark, France, Norway, and Germany.

The Match industry.

Match-making is one of the most important among Swedish chemical industries. Between 1830 and 1840, *J. S. Bagge*, professor at the Technical High School in Stockholm, made great exertions towards obtaining light by means of friction matches. Though the

[1] A quintal = 1·97 cwts. A krona = 1·10 shilling or 0·268 dollar.

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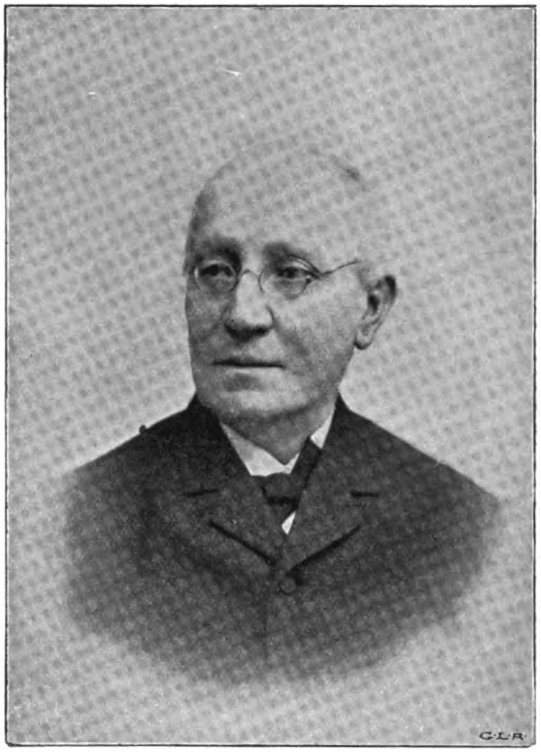

Johan Edvard Lundström.

importance of ordinary phosphorus in the production of matches of that kind was tolerably evident and had actually been pointed out by Berzelius, its use was purposely avoided, until it was discovered that really practical matches could not be obtained without phosphorus in their heads, and Bagge himself drew up directions for the manufacture of them. Phosphorus matches have been manufactured wholesale in Sweden since 1843. The celebrated match-factory in **Jönköping** was founded by *Johan Edvard Lundström* in 1844. At first sulphurized phosphorus matches were almost the only kind made there. In the same year, 1844, however, *G. E. Pasch*, professor at the Caroline Medical Institute in Stockholm, made the discovery that a rubbing surface containing amorphous phosphorus, called by Pasch phosphor oxide, could be used for matches with heads containing no phosphorus. His invention was patented on October 30, 1844 — a date of importance as proving the priority of Pasch's invention against claims on behalf of a German inventor. The manufacture of matches according to the new patent at once began. The method Pasch employed for producing the »phosphor oxide» was not, however, a very practical one, and it was not until a cheaper method had been discovered in England in 1851 that his invention was put to practical service. In this, also, priority belongs to Sweden, for in 1852 the Jönköping Match-factory commenced to manufacture those *safety-matches* which at the international exhibition in Paris of 1855 were pronounced the best of their kind. The wares turned out by the firm have since attained a world-wide celebrity, and there can be few commodities that have been so often imitated in all parts of the world, both as regards labels and general appearance as the »Jönköpings säkerhetständstickor» (safety-matches).

In the progress of match-industry, it has proved necessary to make great use of labour-saving machines, and many had already been

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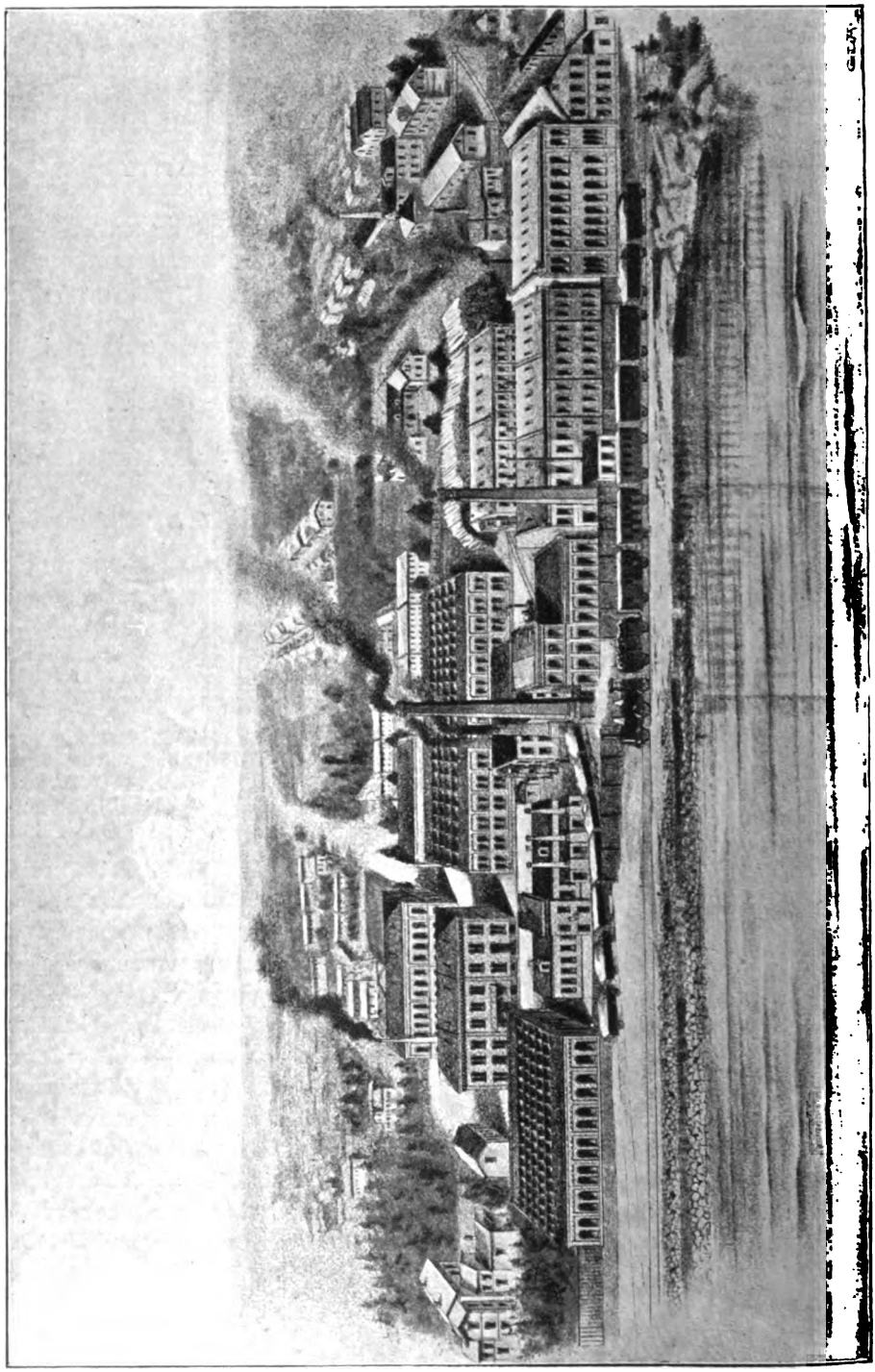

The Old Match-Factory at Jönköping.

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TABLE 126. *Manufacture, imports, and exports of matches.*[1]

Average for the years	Factories.	Workmen.	Production. Value, in Kronor.[2]	Imports. Kilogr.	Exports.	
					Kilograms.	Value, in Kr.
1866/70	19	1,858	1,294,000	3,027	1,739,111	.
1871/75	30	3,578	4,377,000	1,319	6,188,671	3,640,000
1876/80	32	3,755	6,301,000	12,725	8,303,090	5,860,000
1881/85	33	4,920	8,176,000	5,092	11,894,943	8,329,000
1886/90	30	5,059	7,875,000	3,316	13,066,366	8,656,000
1891/95	29	5,494	7,923,000	2,996	14,104,983	8,602,000
1896/00	22	5,697	8,342,000	1,801	15,990,035	7,196,000
In 1900	20	6,102	9,945,000	851	18,801,477	8,461,000

brought into use before 1870, more especially such as are calculated to simplify the arranging of the splints ready shaped in frames previous to their dipping in the igniting composition to form the heads. *A. Lagerman*, by his so-called *complete-machine*, contributed greatly towards reducing the manual labour in match manufacture to a minimum. The match-material, which is first cut by other machinery, is fed into the complete-machine at one end to emerge at the other, ready made and packed in boxes, without the intervention of a single workman in the meanwhile. One of those machines turns out at least 40,000 boxes in a space of 11 hours. The first machine of this description started working in 1892 in the old Jönköping match-factory.

A large number of other match-factories have sprung up by degrees, but many of them were very soon obliged to cease by reason of the severe competition. Though the old phosphorus matches were driven out of favour by the safety-matches, they still continued to be made, but since July 1, 1901, the sale of them in Sweden has been prohibited, on account of the danger concomitant with the yellow phosphorus contained in their heads. They possess, however, one advantage over the safety-matches which cannot be denied them, and that is the possibility of striking them on almost anything; continued experiments and the offering of prizes have now resulted in the manufacture of matches which may serve as a substitute for the old phosphorus matches without containing the yellow poisonous phosphorus, instead of which is used in Jönköping Sesquisulphide of Phosphorus.

Most of the chemicals required in match-making, such as phosphorus, antimony, sulphur, paraffine, etc., must be imported; chlorate of potash, on the other hand, can now be obtained in Sweden. The sort of wood in greatest, and almost exclusive, request for matches is aspen; it is easy to cut up and is sufficiently porous to admit of impregnation with sulphur or paraffine. The home supply of aspen wood of good enough quality for the purposes of match-making has now been so reduced that a considerable amount has to be imported from Finland and especially from Russia.

[1] A kilogram = 2·204 lbs. A krona = 1·10 shilling or 0·268 dollar. — [2] The figures for exports in the last column show that the value of production given is too low.

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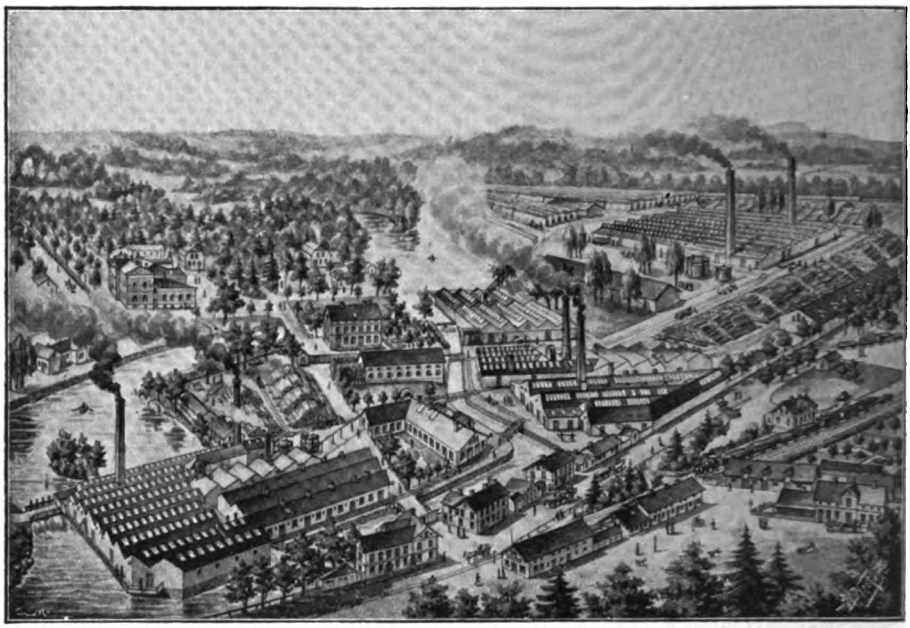

Vulcan Match-Factory, Tidaholm.

The most serious obstacle to the progress of the match industry in Sweden, or even to its continuance in its present proportions, consists not so much in foreign competition as in the excessively high protective duties imposed by other countries to the benefit of their own manufacture — duties often so high as to preclude all import — and also the state monopoly on the manufacture of matches established by several countries, e. g. France, Spain, and Greece.

The largest match-factories in Sweden at present are: The *Vulcan Factory* at Tidaholm, and the *Old Factory* and the *West Factory* at *Jönköping*.

At some factories, the headless splints for matches are made for sale. This branch was estimated at a value of 271,000 kronor in 1900.

The exports of matches go chiefly to Hamburg and London for distribution to all parts of the world. Of the exports in 1900, amounting to a total of 18,801,477 kilograms, 8,613,262 kg. went to England, 5,260,374 kg. to the German Empire, 2,738,223 kg. to the Netherlands, 1,324,715 kg. to Belgium, 440,352 kg. to India, 223,950 kg. to Denmark, etc. The total value of the exports was estimated at 8,461,000 kronor.

In order to avoid a detrimental competition between home manufacturers, and at the same time to facilitate the trade with foreign countries, the most important Swedish match-factories have of late formed a joint-stock company, of which the Vulcan factory and the two factories in Jönköping are the greatest shareholders.

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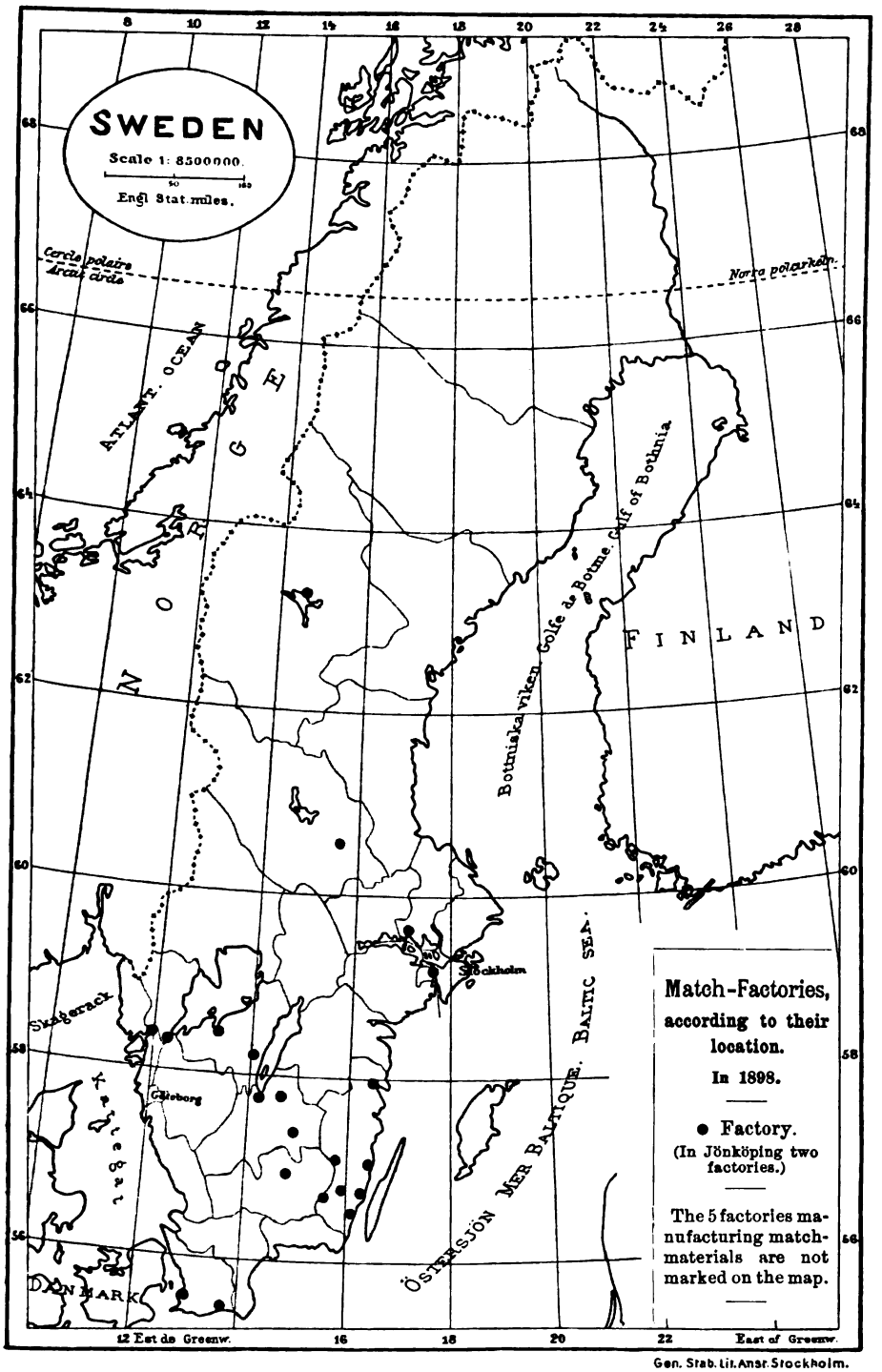

Gen. Stab. Lit. Anst. Stockholm.

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Carpentry and Furniture Factories.

In many parts of the country carpentry as a *handiwork* employment is very general, and on every farm there is usually one man able to undertake, at any rate, rough carpenters' work and the mending of any agricultural implements that may have got out of order. In some provinces it was the general thing in former times in the long winter-evenings, when no outdoor work was possible, for the men to devote their attention to some form of handiwork, such as the making of wooden shoes, chairs, baskets, and other domestic utensils, in like manner as the women were spinning and weaving.

This **carpentry work** was facilitated very materially by the plentiful supply of cheap wood, e. g. oak, birch, alder, and deal. By degrees, this domestic industry has given place to a more extensive one, inasmuch as factories have been established in many places for the fabrication of common furniture and of the wooden fittings up of houses, such as doors, window-frames, etc. One product of this industry that has found a not inconsiderable market abroad, especially in warm countries with a poor supply of native timber, is complete *houses of wood;* a sale for them, especially as summer residences, is also found in Sweden itself. — In the furniture and wooden-house industry the same improved taste has made its mark that has been in evidence in architecture and art-industry generally during the last twenty years.

The exports of carpenters' work in 1900 were valued at 11,392,000 kronor (à 1·10 shilling); that sent to England at 6,300,000 kronor, to Germany at 3,147,000 kronor, to Denmark at 577,000 kronor, etc.

Carpenters' work and furniture-making is done best in the Göteborg och Bohus Län, next come the city and Län of Stockholm and the Jönköping Län. The following are the largest factories: *Ekman's New Carpentry joint-stock Co.* at Sundbyberg, near Stockholm, *Bark & Warburg's*, and the *Lindholmen* Factory at Gothenburg.

In 1900, there were altogether 320 carpentry and furniture factories, employing 10,103 hands and with a turnout valued at 20,044,000 kronor. These figures do not include the factories turning out machines (20 in number, with 612 hands and a turnout valued at 1,086,000 kronor); these are grouped under Machines and Implements.

Other Manufactures.

Cooperies. Casks of various shapes are a requisite for transport in many industries, for instance of butter, snuff, cement, herring, spirits, soap, etc. The manufacture of casks has therefore been made a special industry in modern times. *Thorburn's* cask-factory at Uddevalla is one of the largest, though the turnout varies very much, according to the herring harvest. There were 25 cooperies and cask-factories in Sweden in 1900, with 484 workmen and a production value of 802,000 kronor.

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Wooden Shoes are made either entirely of wood, by preference of alder, being then a very warm, dry, and also cheap footwear, or else of leather in the form of half-slippers on a wooden sole. The last named are more readily made in factories than the former. The manufacture of wooden shoes is carried on chiefly in the Jönköping and Kronoberg Läns. In 1900, there were altogether 20 wooden shoe and last-factories, employing 275 hands and with a turnout valued at 519,000 kronor.

Chip-boxes are made by the million for match-factories. In 1900, there were 9 chip-box factories, employing 462 hands, with a turnout of 1,073,000 kronor in value.

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6. THE PAPER INDUSTRY.

In 1900, there were 63 factories belonging to this head, making paper and pasteboard, and 96 engaged in other allied manufactures. The number of hands was 6,353 and 2,137 respectively, with a turnout value of 24,228,000 and 6,111,000 kronor. Both imports and exports of paper are considerable, for which see below. In 1900, there were imports of wares of this class for 4·41 million kronor and exports for 14·39 millions. This industry is consequently one of those that contribute towards the improvement of our balance of trade.

Paper-mills.

The first papermill is reputed to have been started in the time of King Gustavus Vasa (1523/60). During the last few decades, the paper industry has developed very considerably in conjunction with the growth of the wood-pulp industry. The **varieties of paper** most extensively manufactured are: letter-paper, writing, printing, and wrapping-paper, as well as coarse and fine cardboard or pasteboard. The raw materials are: for the finer qualities of paper, rags mixed to some extent with chemical pulp; for newspapers, rags mixed to a percentage of 50 or 70 with grinding pulp; for other kinds, chemical pulp or rags. For superior kinds of wrappering, termed leather-paper, a semi-chemical pulp is used prepared from boiled wood; for inferior kinds, which are generally coloured, for match-box and other packets, a pulp prepared chemically out of straw is used with advantage. The last-mentioned kind of paper is principally manufactured at *Katrinefors* (Mariestad), a factory established, like the Jönköping factory of *Munksjö*, by *J. E. Lundström*, the famous founder of the matchmaking industry at Jönköping.

Pasteboard is prepared from different materials, according to the purposes to which it is to be put. In this industry the manufacture of **sheathing-paper**, used as a lining of walls and roofs, plays an important

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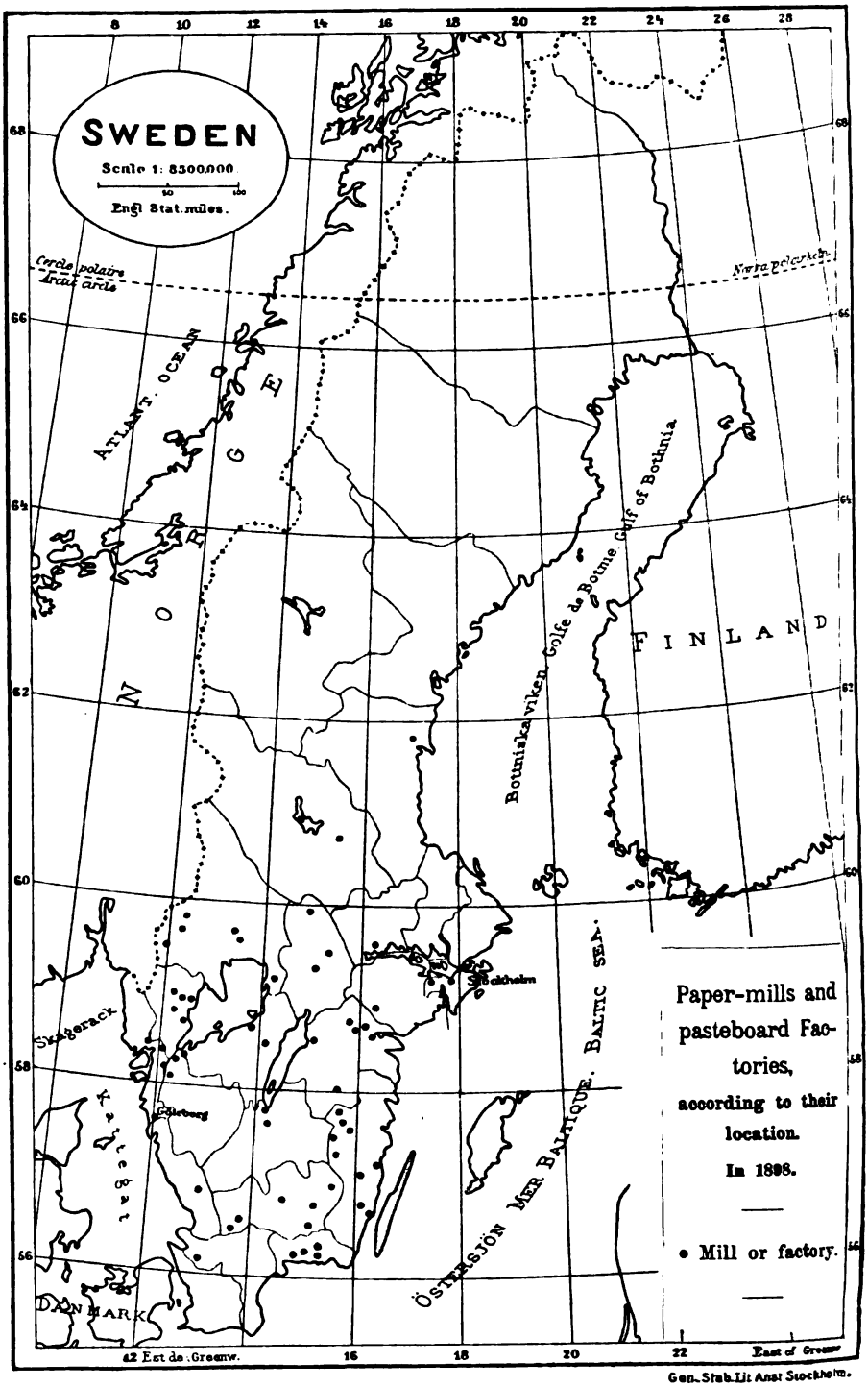

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part; for roofs, the pasteboard is saturated with asphalt-tar. *Munksjö* and *Fiskeby* have attained world-wide renown for their endless rolls of sheathing-paper.

Bank-note and stamp paper are manufactured at the paper-factory attached to the Bank of Sweden and situated at *Tumba*, near Stockholm. At *Grycksbo*, near Falun, a kind of chemical filtering-paper is manufactured, which has been renowned ever since the time of Berzelius. The quality of this paper is dependent to some extent upon the purity of the water and the rags.

Some of the chief factories have been named above. The value of the total turnout at Holmen in Norrköping, Munksjö in Jönköping, Katrinefors in Mariestad, Fiskeby in Östergötland, Lessebo in Kronoberg Län, Klippan in Kristianstad Län, Munkedal in Bohuslän, Lilla Edet and Vargön in Elfsborg Län, and Grycksbo in Dalarne, exceeds half a million kronor. The chief Läns for the paper industry are Elfsborg, Östergötland, Göteborg och Bohus, and Kronoberg; they produce more than half of the total amount for the whole country.

The development of the paper industry during the past thirty years may be seen by the following figures[1]:

Averages.	Factories.	Workmen.	Production. Value, in Kronor.	Imports. Quintals.	Exports. Quintals.
1866/70	63	1,861	4,005,000	1,999	12,881
1871/75	53	2,329	6,419,000	9,600	25,811
1876/80	50	2,442	7,217,000	13,703	62,761
1881/85	41	2,917	7,899,000	15,313	78,482
1886/90	37	3,078	8,819,000	23,155	135,381
1891/95	54	4,579	12,084,000	39,429	244,255
1896/00	57	5,377	18,280,000	54,952	425,907
In 1898	59	5,209	17,724,000	47,407	379,582
» 1899	60	5,513	19,608,000	60,008	473,375
» 1900	63	6,353	24,228,000	48,686	585,894

The official Swedish statistics give the following detailed particulars concerning the paper-industry in 1900. (The figures are in quintals).[1]

	Production.	Imports.	Exports.
Polishing and Emery Paper	1,350	979	127
Brown Paper, Waste Paper, etc.	440,450	331	21,659
Gilt, Glazed Paper, etc.	8,508	2,462	—
Letter, Writing, Printing Paper, etc.	483,888	16,938	478,839
Sheathing Paper, Roofing Felt, Glazed Cardboard, etc.	109,545	26,605	4,232
Other kinds of Pasteboard	94,537	1,371	81,037
Total	1,138,278	48,686	585,894

The paper imported is chiefly of the choicer qualities; it comes principally from Germany. Sheathing pasteboard, etc., comes chiefly from Germany and Finland. More than 80 % of the exported paper goes to England, — chiefly to be used for newspapers.

The *value* of the paper imported in 1900 was 3,102,000 kronor, and of that exported, 13,997,000 kronor. Hence, paper is one of the more considerable exports from Sweden.

[1] A quintal = 1·97 cwts. A krona = 1·10 shilling or 0·268 dollar.

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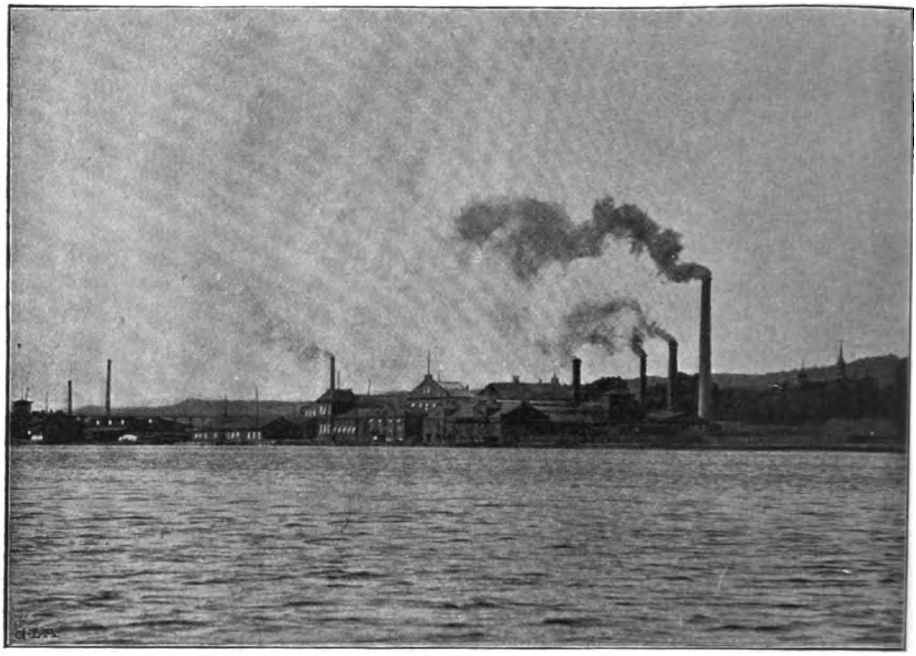

Munksjö Paper-Factory, Jönköping. Photo HOLM, Jönköping.

Manufactured Goods of Paper.

The official factory statistics for 1900 give the following particulars of the manufacture of these commodities (a krona = 1·10 shilling or 0·268 dollar):

	Factories.	Workmen.	Value of production.
Larger Bookbinding establishments	49	1,251	2,566,000 kronor.
Wall-paper factories	7	219	1,233,000 »
Paper-bag and Envelope factories	13	290	1,191,000 »
Album and Portfolio factories, etc.	25	367	960,000 »
Playing-card factories	2	10	162,000 »

As regards **bookbinding**, it is done chiefly as a handiwork trade in small workshops with but few employees. Only the more extensive establishments, where the work is done on factory lines, are noticed here. — The making of office account-books and ledgers is often combined with bookbinding. A notice concerning artistic bookbinding will be found below (section: Art Industry).

Wall-papers and **Edgings.** Wall-papers, as now understood, began to be used in Sweden at the beginning of the 19th century. Nowadays machines are very extensively used for printing wall-papers; they do not, however, produce so good an effect as handwork. The largest wall-paper factory in the country is *Hedenström's* at Norrköping. The home production is, generally speaking, able to meet the demand, though no doubt some amount of import of certain patterns occurs.

Paper-bags and **letter-envelopes** are made chiefly at Norrköping, **playing-cards** at Norrköping and Stockholm.

Pasteboard prepared in a special way and exceptionally hard is used for manufacture of **traveling effects** (called »Unica»), such as hat-boxes and trunks, which are both cheap and very durable.

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7. MANUFACTURES FROM VARIOUS VEGETABLE SUBSTANCES.

In 1900, 37 factories were engaged in manufacturing this class of goods; at them there were 676 workmen, and the value of their turnout was 1,898,000 kronor. The most important article under this heading is **cork.** *Wicander's* cork-factory in Stockholm has a European reputation by reason of its branch establishments in Åbo, Hamburg, and Libau. Its turnout in Sweden is estimated as equal in value to about 1/2 million kronor annually. In 1900, there were 22 cork-factories in Sweden, employing 443 hands and with a value of turnout of 1,574,000 kronor. In 1900, cork was imported, however, for 1,200,000 kronor in the form of cork-bark, and cut corks for 441,000 kronor, while the exports of cut corks only amounted to 114,000 kronor. [1]

There are 6 **basket-factories** with 135 workmen and a value of production of 232,000 kronor. In 1900, the imports were for 168,000 kronor and the exports for 181,000 kronor — hence, a slight preponderance in favour of the latter.

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8. MANUFACTURES OF STONE, CLAY, CHARCOAL, AND PEAT.

This important branch of industry includes the following main subdivisions (the figures refer to 1900):

	Factories.	Workmen.	Value of production. [1]
Stone and Clay manufactures	886	29,024	37,810,000 kronor.
Glass, and Glass manufactures	63	5,801	8,958,000 »
Products of Charcoal and Peat	606	10,149	22,649,000 »
Total	**1,555**	**44,974**	**69,417,000** kr.

This section is closely allied to the mining industries, and many data concerning it will be found under said heading. Thus, on p. 685 and 686 figures are given with reference to the large imports of raw materials for the manufactures here concerned; for instance coal used directly as fuel, and indirectly in gasworks for the production of illuminants. The exports of raw materials are also considerable; the total value of the exports is stated on page 685; regarding the special items, see the following articles.

[1] A krona = 1·10 shilling or 0·268 dollar.

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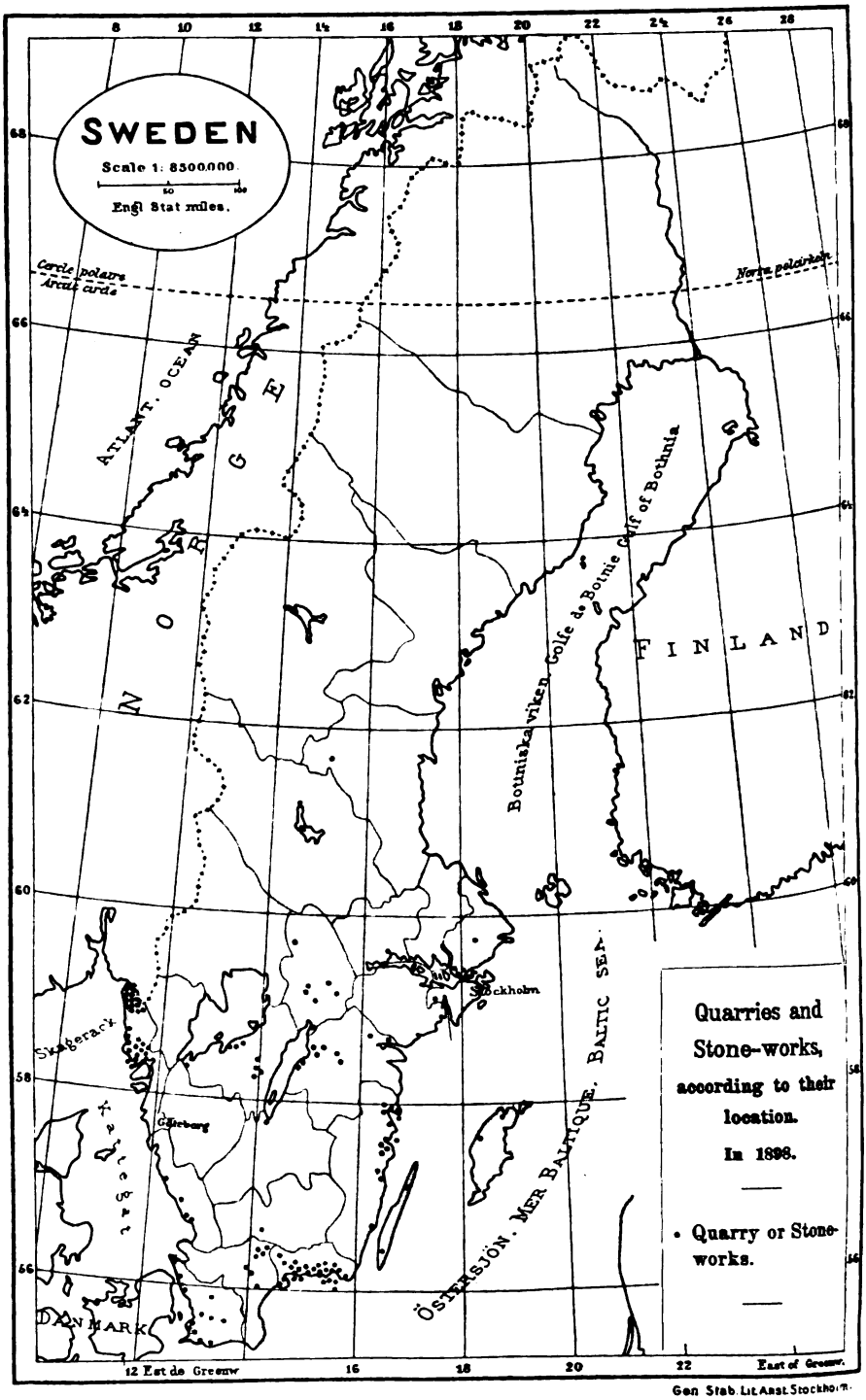

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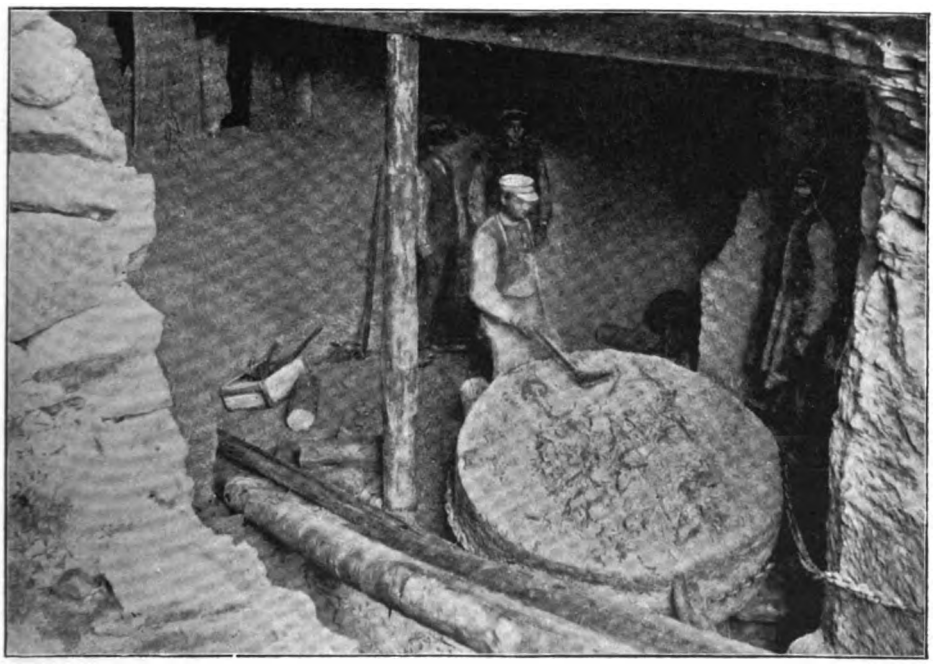
The Stone Industry.

There exists in Sweden a large number of different kinds of stone suitable for building and industrial purposes; of this fact many monumental edifices both of early and recent construction bear witness. Several of the cathedrals and ruined abbeys on the mainland and many of the churches in the island of Gotland are speaking mementos of the skill possessed by medieval builders in treating the native stones of Sweden. The royal palace of Stockholm, dating from the 18th century, stands out specially as an architectural masterpiece, not only in style and execution but also in the way in which a large number of different building-materials have been harmoniously applied in its construction. In quite recent times, public and private buildings in the larger towns, especially in Stockholm, have been built with facings of natural stone.

The stones most employed are: granite and gneiss, limestone and marble of various formations, sandstone from Cambrian and Silurian formations, porphyry, schist, etc. Several kinds of **granite** are found; their structure and colouring are best seen after the stone has been polished. In our larger cemeteries the monuments erected present good samples of gray, green, red, and black granite, together with various intermediate shades of it. Granitiform rocks, colloquially called



The Quarry of Lugnås, Vestergötland.

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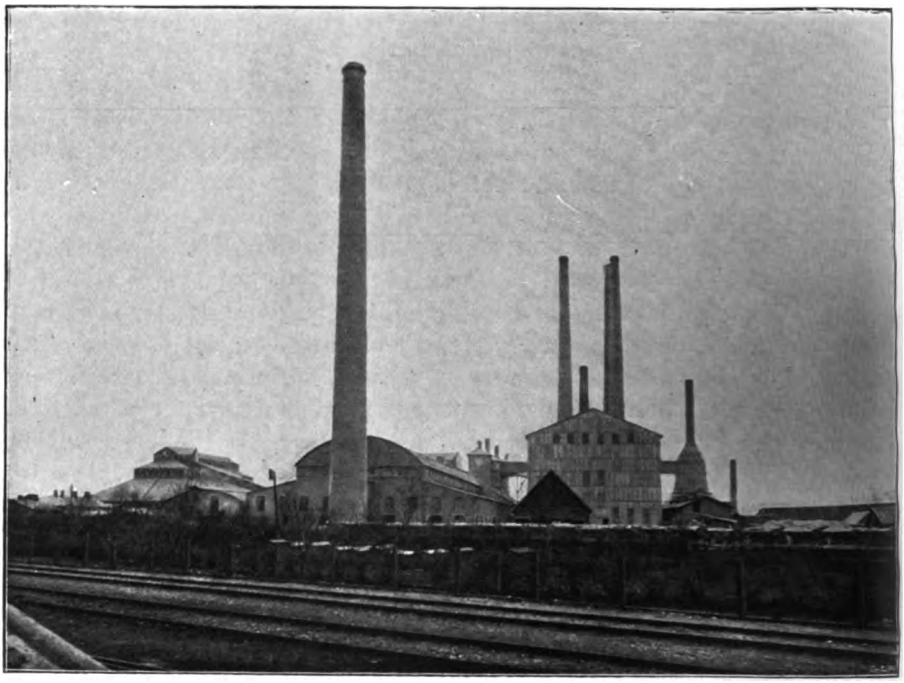

Lomma Cement-Factory.

gray-stone, occurs in almost all parts of the country, but the chief granite quarries are in Bohuslän, Halland, Skåne, Blekinge, Småland, Östergötland, and Uppland. Besides granite the following are also quarried: porphyry, marble, limestone, sandstone, potstone, felspar, and schist.

Porphyry from Dalarne (Elfdalen and Orsa), **marble** from Kolmården, and **potstone** from Jemtland, are chiefly used for decorative articles, such as urns, etc., **limestone** and **sandstone** in large quantities for buildings, the latter also for mill-stones and grindstones, **felspar** for china-ware, and **schist** for roof-slating.

The chief Läns for the stone industry are those of Göteborg och Bohus and Blekinge, the production amounting to 52 % of the total for the country; next come Stockholm city and Län, the Malmöhus, Halland, Örebro, Kalmar, and Kristianstad Läns. In 1900, there were 228 *quarries* and *stone-works*, with 11,697 workmen and a value of production of 11,063,000 kronor; an examination of the figures for exports below will, however, show that the last mentioned figure is too low. In the same year, there were 22 *felspar-quarries*, yielding a total of 15,228 tons of felspar, valued at 186,000 kronor (cf. Table 95, page 682).

Swedish granite has found a market abroad, where it has been employed for street-paving material and, the finer qualities, for the

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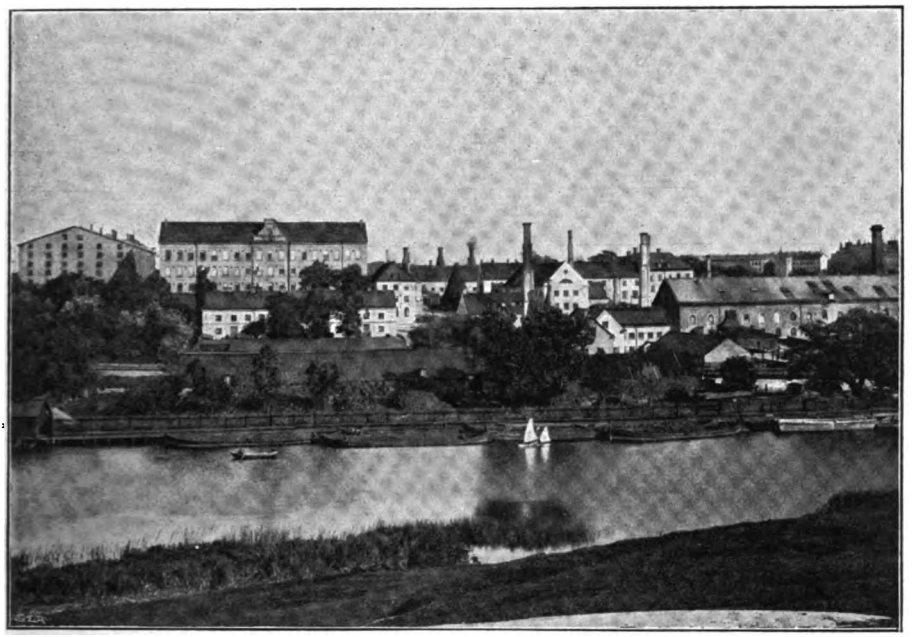

Rörstrand Pottery-Works.

decoration of buildings. The exports of stone go principally to Germany, where, however, the question of levying a duty upon the imports of stone to protect the home production has been frequently mooted; stone is also exported, in smaller quantities, to Denmark, Russia, and England. Owing to the expense of carriage, only such stone can be exported as is quarried in the vicinity of some port. The total **exports** of undressed stone in 1900 were valued at 2,535,000 kronor; of dressed stone at 7,851,000 kronor, grindstones and mill-stones accounting for 46,000 kronor of that amount; of polished stone goods, at 48,000 kronor, and of other kinds at 7,757,000 kronor.

Cement and Mortar.

The manufacture of what is now called **Portland cement** is not of very old date in Sweden, though hydraulic mortar of one kind or another has also had to be used in earlier canal structures. The making of Portland cement on a large scale was commenced at *Lomma* in Skåne in 1871; clay and limestone of suitable quality are to be found there in unlimited quantity. Great care is bestowed upon the manufacture of the cement, which is distinguished for its fineness of quality, whereby it admits of a larger admixture of sand than other kinds. *R. F. Berg*, the manager of the Lomma works, has done a

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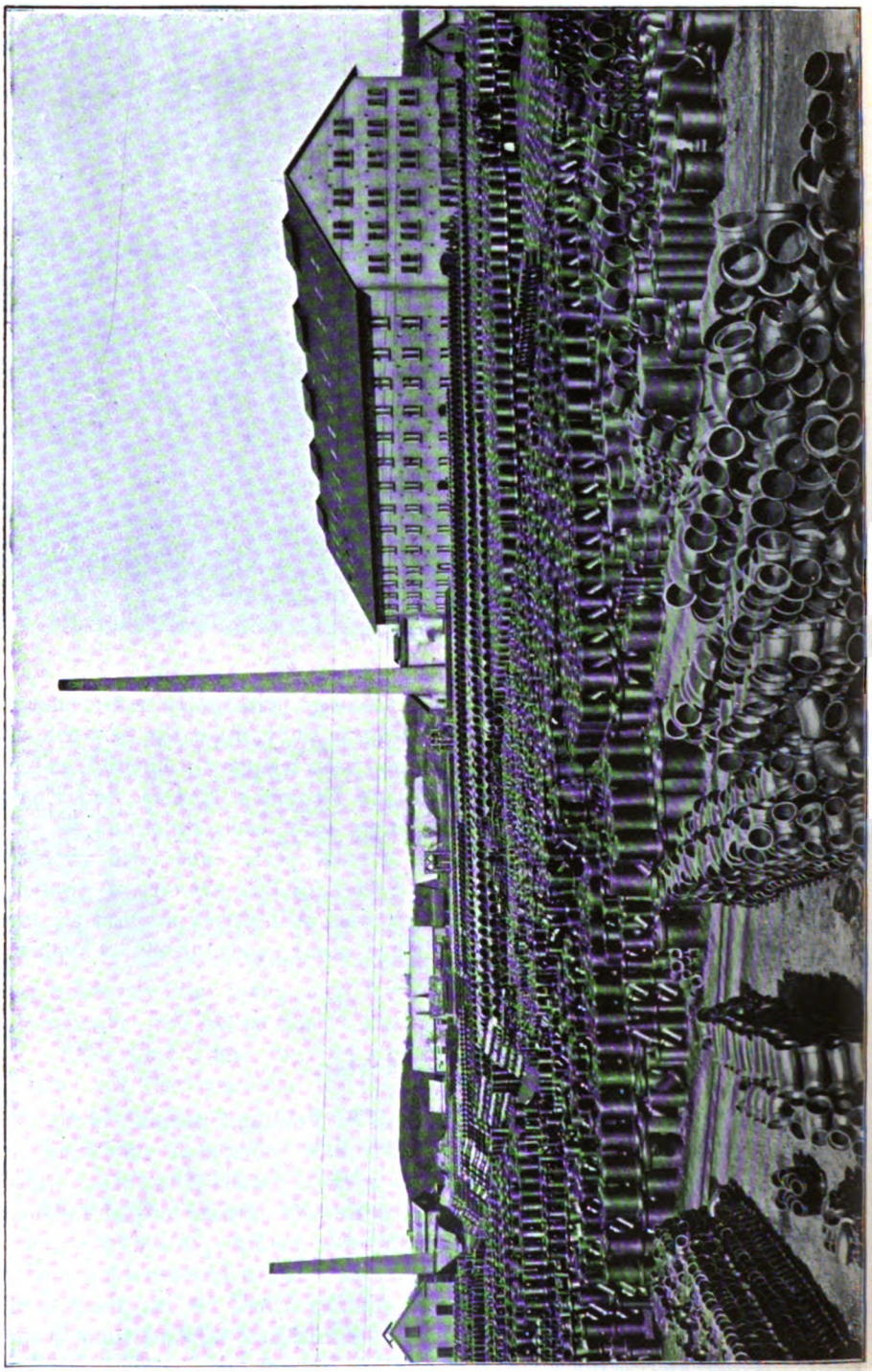

Utterström Iron-rolling Works.

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great deal towards furthering the development of the cement industry in Sweden. Swedish cement, under the name of **Lomma cement**, has, moreover, found a market and considerable approval both in Europe and America. In conjunction with the cement works at Lomma, a factory has been established for **casting** articles in *cement*, as also in *plaster* and *asphalt*. At other places in Sweden the natural conditions necessary for cement manufacture are also to be found and have given rise to the establishment of cement-works in the islands of Gotland and Öland, and at Kinnekulle.

When first started, the Lomma cement-works produced 25,000 quintals (à 1·97 cwts.), but in 1896 more than 400,000 quintals of cement were manufactured at Lomma and its branch works at Limhamn. In 1900, there were altogether 6 *cement-works* in Sweden, with 1,336 workmen and a turnout of 1,259,589 quintals, valued at 4,214,000 kronor. The number of *cement-foundries* was 12, with 729 workmen and a value of turnout of 2,055,000 kronor.

The development of cement-works in recent times will be seen from the following figures (a krona = 1·10 shilling or 0·268 dollar):

Averages.	Value of production.	Imports.	Exports.
1876/80	398,000 kronor.	285,000 kronor.	204,000 kronor.
1881/85	634,000 »	328,000 »	332,000 »
1886/90	1,063,000 »	360,000 »	310,000 »
1891/95	1,829,000 »	69,000 »	971,000 »
1896/00	3,322,000 »	68,000 »	915,000 »
In 1900	4,214,000 »	68,000 »	1,277,000 »

In 1900, 183,440 quintals were *exported* to Denmark, 144,426 to Russia, 92,928 to Finland, and 4,849 to other countries; total 425,643 quintals.

Mortar, too, is to some extent manufactured on a wholesale scale. In 1900, there were 4 mortar-factories at work, their turnout being for a value of 493,000 kronor.

Earthenware.

Of the more recent (postglacial and glacial) beddings which occur in Sweden — upper gray clay, lower gray clay, and stratified clay — it is principally the two latter which are worked to form ordinary, not fireproof, bricks (with an elasticity of compression of 100—200 kilograms per square centimeter), drain-pipes, pantiles, earthenware vessels, and Dutch tiles.

Brickyards are to be found in all parts of the kingdom. For baking ordinary bricks, the old kilns, which were heated with wood, have had increasingly to give way to annular kilns, in which the heat is maintained continuously, the fuel being usually coal-dust. The first annular kiln was constructed in 1873 by the Skåne Cement Company. At all the larger brickyards, machines are nowadays employed to shape the

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bricks, in place of hand-labour. A serious obstacle to the development of this industry is the short period (from three to four months in summer) during which the manufacture is pursued. To obviate this, special, well constructed drying kilns have been introduced in one or two places to render it possible for the unbaked bricks to be dried quickly and thoroughly before their insertion in the baking-kiln.

Gustafsberg Pottery-Works. Workshop for Handpressing.

In the carboniferous formation of Skåne, alternate strata of coal and fireproof clay occur in many places. By reason of this convenient supply of fuel, a very extensive earthenware industry has arisen in that province; about 40 % of the coal raised is used in the manufacture of fireproof products out of the accompanying clay, such as fire-bricks, possessing the power of resisting fire to a greater or less degree (elasticity of compression 100—200 kilograms per square centimeter), clinker-baked hard bricks (elasticity of compression 300—500 kilograms per square centimeter) for canal structures, facades, etc., and salt-glazed drain-pipes and earthenware of various kinds.

Of the factories making these goods, *Höganäs* deserves special notice. It was founded in 1798 but did not begin to make fire-bricks until 1827. The salt-glazed earthenware bottles, etc., from Höganäs have long been highly prized, and in recent years the company have extended the range of their manufacture to include ornamental articles, decorated in majolica colours, and also discharge-pipes, etc., which, when made of

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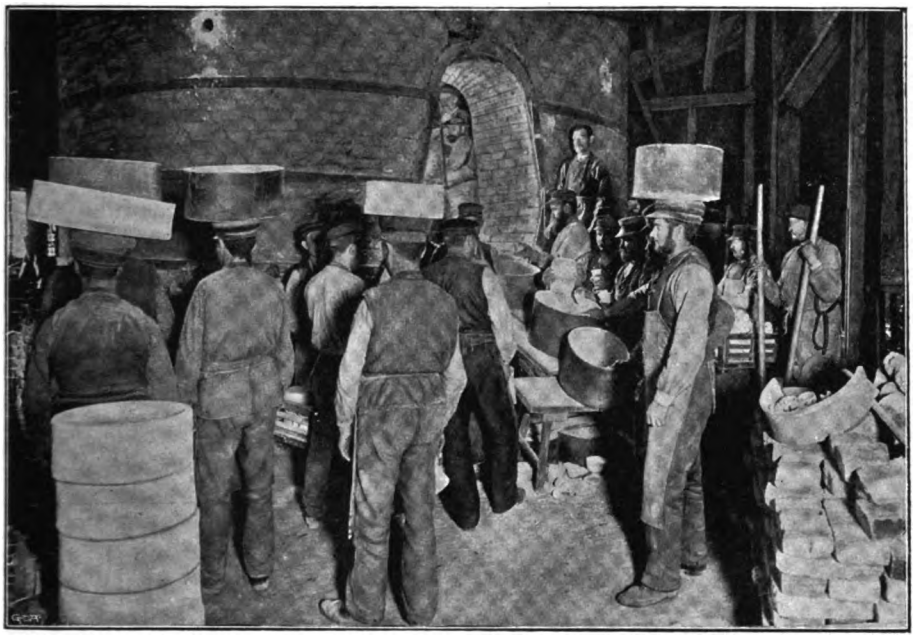
earthenware, resist the action of chemical agents better than when made of metal. The clays obtained at *Bjuf* and at *Stabbarp*, the latter belonging to Höganäs, are fireproof in an eminent degree, being capable of resisting a temperature of 2,100° C. The *Billesholm—Bjuf* Company was formed in 1870, and the *Skromberga* Company in 1886; the latter also makes hard-baked paving-stones, which have a hardness almost equal to that of emery.



Gustafsberg Pottery-Works. Emptying a Biscuit oven.

In spite of the large quantity of quartz and quartz-stone to be found in Sweden, the manufacture of bricks of that material is very limited. With regard to the *shape* of the bricks, that known as the »normal shape» is usually adopted now in southern and western Sweden; the dimensions are $250 \times 120 \times 65$ millimeters; but in eastern Sweden and in the greater part of the country as a whole the old and larger shape is retained, with dimensions of $300 \times 150 \times 75$ millimeters, though that size is far less convenient to deal with and to transport.

In *colour*, fire-bricks are most often yellow, while the ordinary bricks are red or else more or less yellowish flamy, according to the composition of the clay used and the nature of the brick-kiln.

The production of fire-bricks in 1900 amounted to 160,585 metric tons; no great amount of increase has taken place in recent years. In the same year, 35,843 tons of clay for clinkers were turned out. Engaged in the manufacture of bricks there were no less than 492 *brickyards*, employ-

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Specimen of Rörstrand Pottery.

ing 10,337 workmen. The manufacture, estimated in value at 10,412,000 kronor, included 1,158,084 quintals of fire- and facade bricks, 1,964 quintals of floor- and wall tiles, 225,601 quintals of pipes and parts of piping as well as 286 million ordinary bricks and clinkers, and 28 million pan-tiles.— There were 10 *stone-* and *earthenware factories*, with 436 employees and a production value of 1,238,000 kronor.[1]

Sweden is now able to dispose of more bricks than it requires to purchase. The **imports** of earthenware goods are nevertheless very considerable. Apart from china and kindred ware of a higher quality, treated in the following paragraph, the imports in 1900 had a total value of 1,319,000 kronor, consisting for the most part of all kinds of bricks, the coarser qualities coming from Norway, and the finer from England. Moreover, the raw material, clay, is imported, chiefly from England, to a value of 514,000 kronor (included in the above figures). The **exports** in 1900 were as follows: clay to a value of 185,000 kronor, bricks 1,977,000 kronor (fire-bricks, etc., 737,000 kronor, ordinary bricks and clinkers 1,237,000 kronor, pan-tiles 3,000 kronor), and pipes, parts of piping, etc., to a value of 727,000 kronor, making a total of 2,889,000 kronor, or considerably more than the imports. Fire-bricks are sent to the adjacent countries (including Russia), ordinary bricks and clinkers chiefly to Denmark and Germany, pipes and parts of piping chiefly to Denmark.

Chinaware (Pottery).

Chinaware is made at two large factories, *Rörstrand* and *Gustafsberg*, the former in Stockholm city, the latter in its vicinity. The Rörstrand factory was founded in 1726; in 1782 it was united with the

[1] A krona = 1·10 shilling or 0·268 dollar. A quintal = 1·97 cwts.

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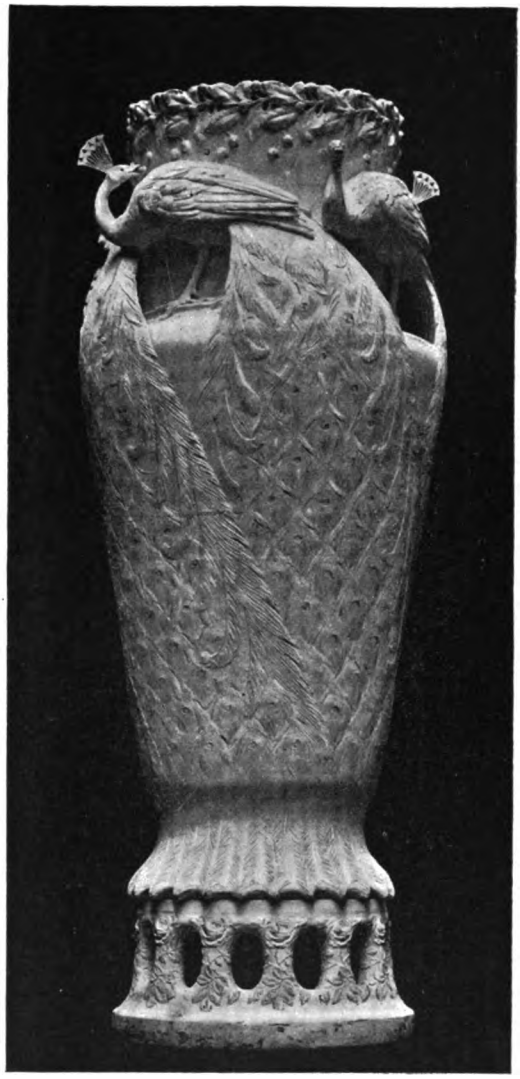
Marieberg factory, founded in 1758 but laid down already in 1788. These two factories manufactured chinaware for domestic use, tiles for stoves, and ornamental articles. Since 1820 Rörstrand has successfully manufactured so-called *flint-china*, with a transparent glazing. Gustafsberg was established in 1827, and for the first few decades of its career produced the same wares as Rörstrand. Between 1850 and 1860, energetic efforts were made to develop and modernize both factories. In recent years they have worked to some extent on the same lines, with regard for instance to services, vases, etc., but have also each developed special lines of their own. Thus, **Rörstrand** turns out chinaware of genuine felspar as also ornamental tile stoves, and has devoted attention to the newest styles of colour-decoration in ceramic. **Gustafsberg** has attained renown for its beautiful articles in »Parian marble», usually reproductions of pieces of sculpture, and for its unglazed jasper ware (Wedgewood).



Specimen of Rörstrand Pottery.

The raw material employed is imported, largely from England, though a certain proportion of home-produced clay is also used; thus, refractory clay is obtained in Skåne or England, flint or quartz from Denmark or France. The present heads of the firms, *R. Almström* at Rörstrand, and *W. Odelberg* at Gustafsberg, have done a great deal to promote the development of the ceramic industry in Sweden. The choicer kinds of pottery made in Sweden occupy a very prominent position for their artistic excellence. See further section: Art Industry.

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Between 1870 and 1880, the value of production at the Swedish chinaware factories amounted to 1,930,000 kronor annually; during the succeeding decade, to 2,491,000 kronor; and between 1890 and 1895, to 2,734,000 kronor annually. In the year 1900, it is stated to have been 3,270,000 kronor; for real china the amount was only 626,000 kronor, the remainder representing the value of the manufacture of faience ware. The number of workmen employed at the two factories named, in 1900, was 1,825. The amounts of imports and exports, calculated according to their value, were (in kronor à 1·10 shilling or 0·268 dollar):

	Value of Imports.		Value of Exports.	
Averages.	Real China.	Faience.	Real China.	Faience.
1871/80	208,000 kr.	101,000 kr.	5,000 kr.	52,000 kr.
1881/90	308,000 »	346,000 »	46,000 »	347,000 »
1891/95	652,000 »	415.000 »	73,000 »	380,000 »
1896/00	924,000 »	379,000 »	89,000 »	146,000 »
In 1900[1]	993,000 »	410,000 »	10,000 »	64,000 »

Under the heading of faience are included in the exports and imports returns: Dutch tiles, stove-ornaments, crockery, glazed and unglazed, multi-coloured brick building ornaments, terracotta goods, terralith, majolica, imitation china, and other varieties of faience ware.

The above figures point to a great increase in the use of china in Sweden. In spite of the excellence of the goods turned out by Swedish manufacturers, which circumstance sooner or later is likely to secure a market abroad for them, the exports have hitherto been but inconsiderable, and have for the greater part gone to Norway.[1]

Dutch Tile and Earthenware Manufacture.

Tile stoves and articles of stone and earthenware were probably first manufactured in Sweden in the 17th century; up to that time, and even later, open fireplaces were in vogue. *A. J. Westman*, stove-builder, did a great deal between 1840 and 1850 towards developing the branch of industry he himself pursued. For making **Dutch tiles** plastic stratified clay-marl is used, a plentiful supply of which is found in many places all over the country. The clay found near Uppsala has long been considered the best for the manufacture of tiles, and has found a market also abroad. In that town there are several tile factories, among which the *Uppsala—Ekeby* occupies a very prominent position.

The Dutch tile industry has recently developed a greater variety in ornamentation and in pattern and over-glaze colours; the finer types of stove tiles in appearance approach the »majolica» and are also designated by that name. The splendid majolica stoves made at Rörstrand are of foreign raw material.

[1] The decrease in the export of 1900 is probably owing, at any rate in some measure, to a circumstance already pointed out several times in the preceding, that since the repeal of the Swedish-Norwegian Commerce Treaty (see p. 190), the figures bearing upon the export to Norway have been *very incomplete*.

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At some stove tile factories there are also dishes and pots made of ordinary plastic clay, with or without glazing. For making salt-glazed earthenware or so-called **stoneware**, refractory clay is employed. This industry thrives specially at *Höganäs* and *Skromberga*, in the province of Skåne.

The export and import figures for tiles and crockery are included in those for faience — see above (section: Chinaware). With regard to the *manufacture* in the country, it was valued in 1900 at 1,808,000 kronor for tiles, and 1,238,000 kronor for earthenware.

Lime.

Several geological formations, for instance the primary formation, the Silurian, the Cambrian, and the chalk formation, yield the raw material necessary for the production by industrial means of carbonate of lime. At limeworks, limestone is burned to form quicklime; at chalkworks, loose chalk in its natural state is washed and purified.

Limeworks are found in 15 of the Läns in the country. The largest number are in the province of Skåne; after that come the Läns of Skaraborg, Örebro, and Gotland. In 1900, there were 61 limeworks, employing 1,043 hands. The turnout amounted to 1,574,691 hectoliters, valued at 1,698,000 kronor. The number of chalkworks was 10, employing 87 workmen and with a turnout of 173,594 quintals, valued at 222,000 kronor. (A hectoliter = 3·5 cubic feet. A quintal = 1·97 cwts.).

In 1900, there were imports to Sweden of 26,688 hectoliters of lime, at a value of 39,000 kronor; the imports of chalk were still less in amount. In the same year there were exports of 84,242 hectoliters of lime at a value of 100,000 kronor, and of chalk at a value of 107,000 kronor.

Kieselguhr or infusorial silica, consisting of the silicious skeleton of a diatomean, is found in considerable layers in Sweden both at Osby, in Skåne, and in Lappland. Its chief use is as an isolating medium for steam boilers, baker's ovens, etc., and for dynamite. In 1900 there were two factories for the preparation of this article, with a turnout valued at about 15,000 kronor.

Glass Manufacture.

Glass has been manufactured in Sweden since the decade of 1641/50, when a glass-work was established in Stockholm, but the industry does not seem to have reached to any degree of development until about the middle of the 18th century. At that time some of the works still in existence were started: Limmared in Vestergötland, 1740, Kosta in Småland, 1741, Sandö on an island in the Ångerman elf, 1750, Liljedahl in Vermland, 1761. Subsequently, new works also have been started: Reijmyra in Östergötland, 1808, and Eda, Surte, Glafva, etc.

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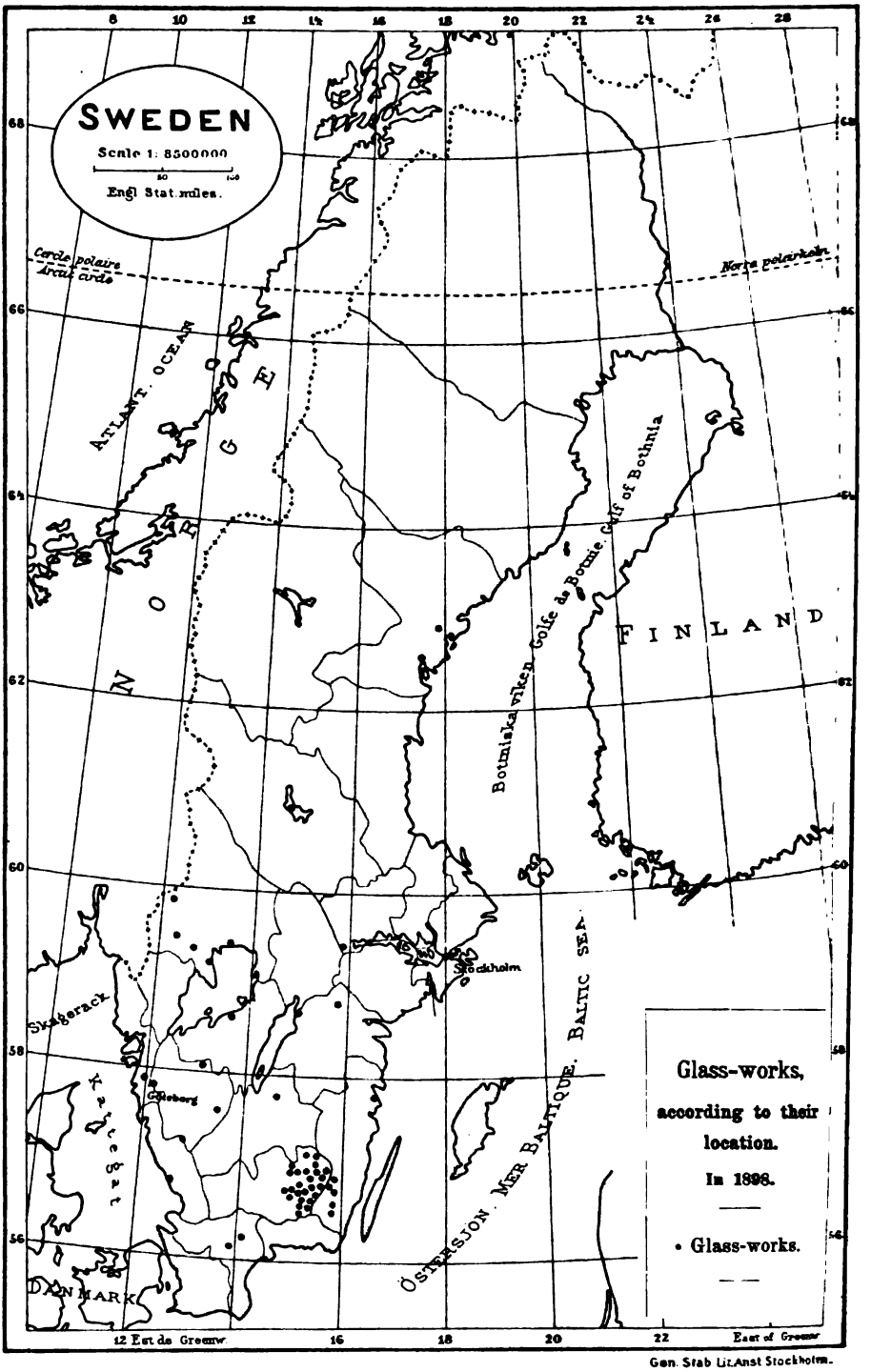

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The great development and scope of the glass industry in Sweden in recent years has caused the works in general to take up special lines. *Reijmyra* and *Kosta* chiefly make ornamental glass and superior kinds of crystal glass articles for domestic use; *Limmared*, chemists' glass wares; *Sandö* and *Glafva*, window-glass; *Eda*, *Surte*, and *Liljedahl*, bottle-glass; *Pukeberg* and *Färeköp*, lamp-glasses, oil-reservoirs, etc.

At the larger glass-works, the old long furnaces, heated with wood, have given place to regenerative gas-furnaces with open crucibles. As fuel may be used either wood, sawdust, or peat. At some places another system of furnaces has also been introduced, in which there are 8—12 covered in and very large smelting vats, each large enough to contain 500—1,200 kilograms of molten glass; these furnaces are heated by a coal-fire. Improved methods of pressing and grinding glass, and of etching upon it, have been introduced; Swedish glass can lay claim to having reached a very high standard in almost all branches of the industry. In the artistic grinding of and etching on glass, the productions of several Swedish glass-works, especially Reijmyra and Kosta, will bear comparison with those of almost any similar factory in the world. The manufacture of large sheets of plate-glass for windows and mirrors, is not yet carried on in Sweden, and hence there is a large import of that kind of glass for modern shops.

Specimens of Glass-ware from Reijmyra.

In the glass industry, the Kronoberg, Vermland, and Elfsborg Läns come first; they manufactured more than half the total turnout, which in 1900 was estimated at the value of 8,725,000 kronor (à 1·10 shilling). Of that total, 3,388,000 kronor were allotted to glass dishes, jars, bottles, and flasks (unground), 1,976,000 kronor to plate-glass for windows and mirrors, and 3,361,000 to other kinds of glass-ware. Between 1870 and 1880 the production for the whole country had a value of 2,654,000 kronor annually, in the next decade of 3,008,000 kronor, and in 1891/1900 of 5,841,000 kronor. The number of glass-factories in 1900 was 56, employing 5,702 workmen.

Both the imports and exports of glass are considerable, the latter, however, is in excess of the former. In 1900, the *imports* were valued

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Glass Bowl from Reijmyra.
Height: 44 centimeters. Diameter: 52 centimeters.
(Or respectively 17·3 and 20·5 inches.)

at 1,708,000 kronor, 805,000 kronor being for plate-glass for windows and mirrors; most of the glass imported comes from Belgium. One article which might very well be manufactured in Sweden but which is imported in increasingly large quantities, is photographic dry-plates; in 1900, the value of the import of that article alone was 207,000 kronor. — The *exports* of glass-ware in 1900 reached the value of 3,143,000 kronor, of which 881,000 kronor were for glass dishes, bottles, etc., and 2,262,000 kronor for other kinds not specified. More than 91 % of the total exports were sent to England.

Pounded glass or *glass-dust* was manufactured at one factory in 1900, the value of production being 6,000 kronor. — *Painting on glass and china* was carried on at four factories in the same year, the value of production being 68,000 kronor. — *Mirrors* are made by lining sheets of glass with amalgam; that is usually carried on as a handiwork trade. There are, however, a few factories engaged in the manufacture of plate-glass for mirrors.

Peat Manufacture.

In Sweden there are about 4 million hectares of peat-mosses available for the production of peat; their average depth is 2 meters. Every hectare of medium quality peat-moss yields nearly 2,000 tons of prepared peat; the total area, therefore, of mosses corresponds to 8 thousand million tons of peat for fuel, which, on the supposition that peat possesses half the heating power of coal, is equivalent to 4 thousand million tons of coal, or enough fuel to last for centuries. With the exception of Russia, there is no country in Europe having such a plentiful supply of peat as Sweden, and scarcely any country has peat of so good a quality.

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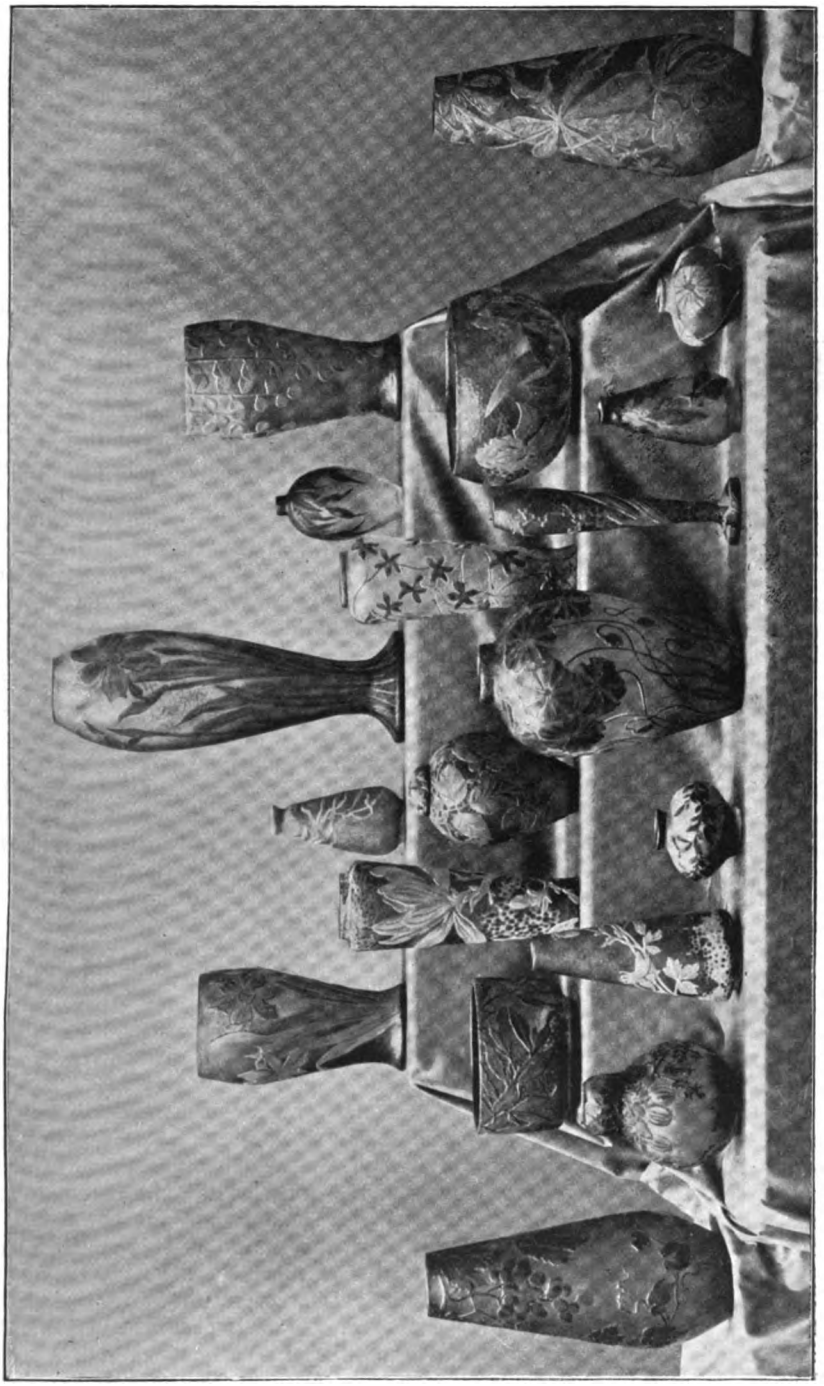

Glass-Ware from Kosta.

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Peat has of old been used as fuel for domestic purposes in those districts where wood is scarce. The peat-mosses are for such purposes worked up into **cut-peat;** pieces of peat are cut out by hand, and are then left on the ground to dry, when the percentage of water decreases to 25—30 (raw moss-peat contains from 75 up to 90 % of water). The size of the peat pieces varies, but in order to become well dried they ought not to be larger than 25 × 15 × 8 centimeters (10 × 6 × 3 inches). Besides this method, which is the simplest and up to 1840 was the one exclusively in use, there are also others, in which the peat, prior to the moulding, is crushed with addition of water into a thick pulp, which is subsequently carted out on the drying-grounds and moulded by means of a grate or else simply by means of an iron-scratch. This so-called **crushed peat** has the advantages, partly of becoming more uniform, inasmuch as different layers of peat in the moss can thus be mixed together, partly of more easily getting dried in changeable weather. A third way of preparing peat produces the so-called **tubular peat.** In this, the peat is also crushed, but without the addition of water, and is afterwards moulded into tubular strings, which are left to dry on racks.

Nowadays the making of peat is also carried on upon a large scale for sale. Crushed peat as well as machine-made peat or **compressed peat** is made for the purpose. In the manufacture of the former, the peat is worked in a horizontal semi-circular wooden box, in the middle line of which is fixed an iron or wooden shaft, furnished with obliquely projecting iron blades; this shaft is also connected with a small pump, which carries water into the box. The shaft, furnished with blades, is put in rotation through a horse-gear-, portable engine-, or petroleum motor. In the preparation of compressed peat the different layers of peat are first dug out and well mixed, after which the peat is moulded, without adding water, into bricks in a machine resembling a brick-press. The percentage of water in compressed peat is reduced to 22.

Attempts have been made to refine peat so as to produce from it a more **concentrated** form of fuel, partly as peat-coal, and partly as powdered peat. The manufacture of bricklets does not now meet with any technical obstacles, and the bricklets get the same specific gravity as fossil coal, or even become somewhat heavier. But the heating capacity of the bricklets is but slightly greater than that of ordinary machine-made peat, while the cost of production becomes about twice as high. **Peat-coal** seemed at first to promise well, but no fully satisfactory method for its production at a remunerative rate has yet been discovered. Where it would be desirable to use peat in the form of charcoal, for instance in blast-furnaces, burning the peat in an ordinary charcoal kiln would seem to be the best method in this country, inasmuch as that does not involve any expensive plant. — Peat-coal not made into bricklets, is certainly heavier than charcoal, but it is more than twice as voluminous as fossil coal, although per weight it possesses about the same heating capacity.

Powdered peat is a new product, obtained by air-drying the peat until it contains 40—45 % of water, after which the rest of the water evaporates by kiln-drying. With some varieties of peat it is possible, subsequent to drying, to remove the fibrous part of the peat, which is suitable for use as a textile substance; this naturally reduces the final cost of production of the powdered peat. Powdered peat fed into an oven where a flame has been kindled, ignites at once and produces a very considerable heat which lasts a long time. Should the financial side of the production prove favourable, there is every reason to suppose that this form of fuel will be very extensively employed. As fuel, peat has in general up to date occupied but a very subordinate position in comparison with wood and fossil coal. It seems, though, as if gradually a change will take place in this respect. In 1901 there were in Sweden 27 peat factories, with a production

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value of 284,000 kronor. As a rule, however, peat is consumed *at the place of production*, and it is hence impossible to make an accurate statement as regards the total production for the country; it is estimated, though, as amounting to a value of somewhat more than 1 million kronor annually.[1] There are consumed 35 à 40 thousand tons in metallurgic works alone.[1]

Everything seems to point in the direction that peat deserves to gain a more extensive use. Every form of fuel is judged of at large according to its heating capacity, which is arrived at, either by experimental burning of given quantities, or by calorimetric analysis. From such analysis Professor P. KLASON has ascertained that 10 tons of coal are equivalent to 18 tons of machine-made peat, 20 tons of cut-peat, and 20 tons of firewood. The price of dry cut-peat at the place of production is now quoted as being 4 kronor per metric ton, and of machine-made peat 5—6 kronor. The average price of fossil coal at Swedish ports during the years 1891/1900 was 18·50 kronor. Prices of pine firewood have risen considerably during the last few years and may be now said to range at 12 kronor and upwards for a fathom of four cubic meters, each cubic meter to a weight of 375 kilograms,[1] — which works out at about 8 kronor per ton. On the basis of these prices, machine-made peat at the place of production would, as regards the heating value, be half as expensive as fossil coal and 30 per cent cheaper than pine firewood, and cut-peat still cheaper. When costs of freight are added, the comparison becomes more complicated. The disadvantages with regard to peat are its being so voluminous and containing such a great percentage of ashes.

One more way in which peat is made use of, still remains to be mentioned, viz. as **moss-litter** and **peat-mould** for disinfecting purposes. For the making of these, the incompletely mouldered layers in the mosses, so-called white-moss peat, are used. These are air-dried and grated in machines, after which the finest dark powder, the peat-mould, is separated from the fibrous elastic substance in the moss-litter by means of a bolting-machine; each kind is by itself compressed into bales. Moss-litter is admirably adepted for strewing on the floors of cattle-stalls. It makes an especially soft, elastic, and dry bed for the animals, is a good absorbant of fluid substances and takes up gasiform, evil-smelling ones; in brief, at the same time as it takes up the dung, it retains its full manuring value, and also purifies the atmosphere in the cow-house. Moss-litter besides makes a good packing material.

Peat-mould lends itself specially well to the purposes of a night-soil, inasmuch as it has the virtue of entirely removing the evil odour of excrement. The peat-mould is best applied by means of a patent self-strewer. By virtue of the slightly acid nature of peat-mould it is also a powerful disinfectant for the destruction of contagion-bearing bacteriæ; its capacity as such may be considerably intensified by an addition of 2—3 % of sulphuric acid. Peat-mould makes an excellent manure for corn and sugar-beets, subsequent to its being saturated with waste lye from the sugar factories.

In 1901 there were in Sweden 39 moss-litter and peat-mould factories, with a production value of 493,000 kronor. — In 1902, by act of the Riksdag, a **Fund** of 1,500,000 kronor was formed for the support of the peat industry by granting advance loans on moderate terms. The State has besides of late contributed to the encouragement of the peat industry by the employment of an *expert* in the peat manufacture, together with an assistant. — At Emmaljunga, in Skåne, there is a *school* for instruction in the peat industry.

[1] A krona = 1·10 shilling or 0·268 dollar. A ton = metric ton à 2,204 *lbs.* A cubic meter = 35·32 cubic feet. A kilogram = 2·204 *lbs.* A fathom of pine firewood is thus equal to about 141 cubic feet or about 3,300 *lbs.* A krona per metric ton = 1·12 shilling per English ton à 2,240 *lbs.*

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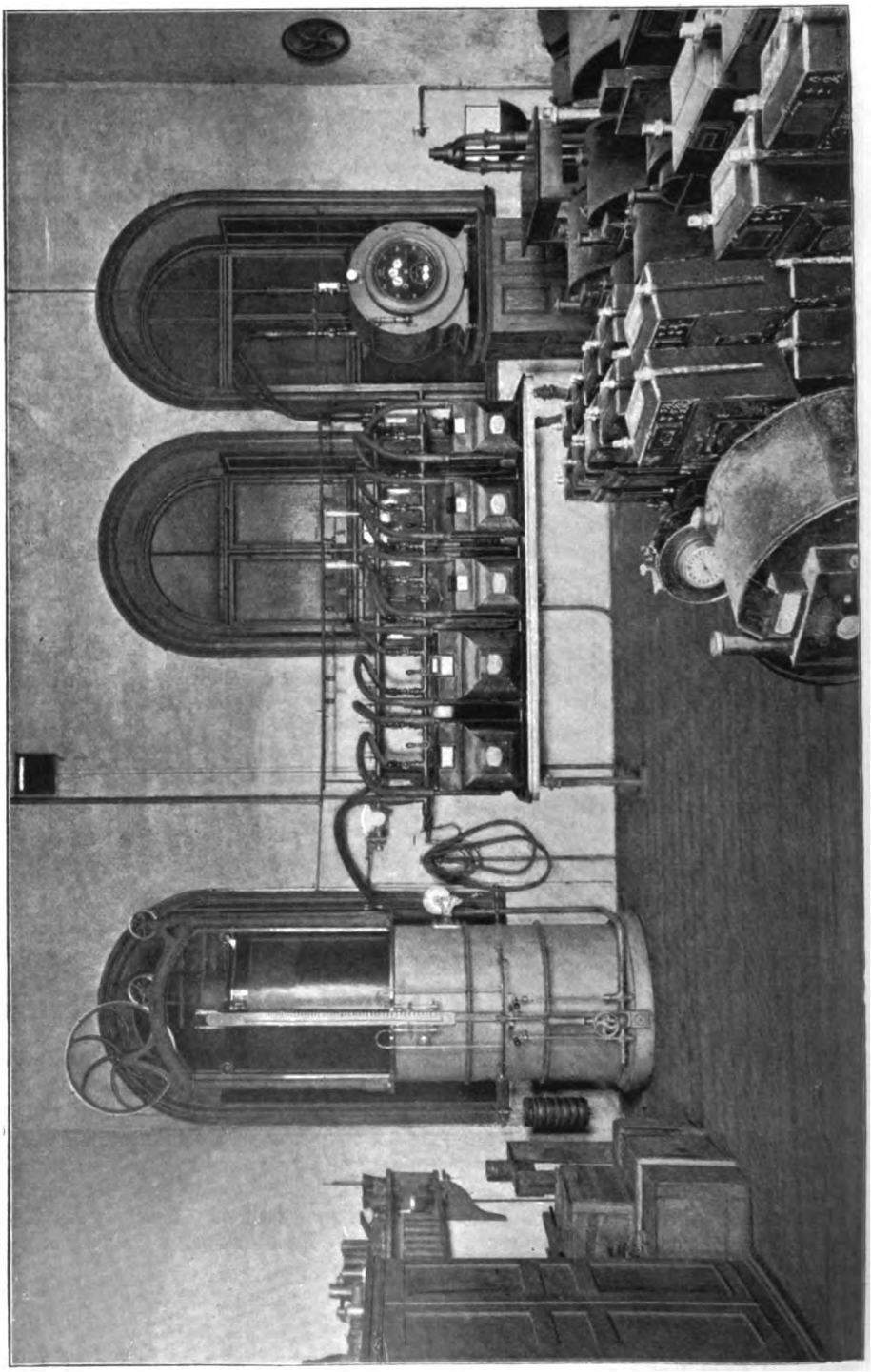

Gothenburg Gas-works. Gas-meter Testing-Room.

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Charcoal.

The Swedish statistics of industry include in the group now under discussion the manufacture also of charcoal; in 1900 there was as much as 28,223,380 hectoliters produced (a hectoliter = 3·532 cubic feet), at an assessed value of 14,084,000 kronor. The total number of factories producing it was stated to be 504, employing 7,645 hands. The greatest turnout was in the Kopparberg Län, its value being 3 million kronor; then came the Läns of Gefleborg, Vesternorrland, and Örebro, each with a turnout valued at 1—3 million kronor. — A detailed account of this manufacture has been given above (section: The Iron and Steel industry).

Gas and Acetylene.

Gas was first used as an illuminant in Gothenburg in 1846, in Norrköping in 1852, and in Stockholm in 1853. There were 27 gasworks in Sweden in 1900, employing 993 hands and manufacturing 44,698,606 cubic meters of gas (more than half of which was produced at the Stockholm gasworks), and 93,312 quintals of coal-tar.* — The annual consumption of gas in Stockholm for the five-year periods 1856/1900 has averaged 13·1, 19·7, 20·1, 23·9, 30·4, 35·2, 44·9, 56·1, and 75·8 cubic meters per inhabitant. In 1900 it was as much as 85·5. In Gothenburg and Malmö the figures for 1898 were 35 and 48 respectively.

Gasworks have as a rule been originated by private companies, but the towns have reserved to themselves the right of taking them over after a certain number of years. In the large towns the gasworks form a very appreciable source of income (that of Stockholm in 1901 yielded a profit of nearly 1⅔ million kronor). Besides being used as an illuminant and a heating agent in domestic cooking, gas is employed as a *driving power* in gas motors. These motors are exceedingly convenient and easily managed, especially when a power not exceeding ten horse-power is required.

As already mentioned above, gas is now used as a kind of **fuel** in households (there are about 40,000 gas stoves in use in Stockholm alone); occasionally also in those industrial establishments where an even and easily regulated heat is required, what is called generator-gas is made use of, the fuel, preferably coal, being transformed into gas before being used as a heating agent. *Water-gas*, used so much abroad, especially in America, has not yet been at all generally introduced into Sweden, though now that *C. A. Dellwik*, a Swede, has discovered an economical method of producing it, it is likely to gain favour.

The coal-tar produced at the large gas-works is used to make asphalte, carbolic acid, creosote and other oils, which are used for impregnating wood and paste-board. For the figures of the import and export of coal-tar see Table 92, page 667, and for the *manufacture of coke* see page 713. — It has not proved remunerative to preserve the sulphur present in the composition used to purify gas; the ammonia, on the other hand, that is given off in the process, is collected at some of the larger gasworks, chiefly in the form of sulphate of ammonia.

* A cubic meter = 35·32 cubic feet. A quintal = 1·97 cwts.

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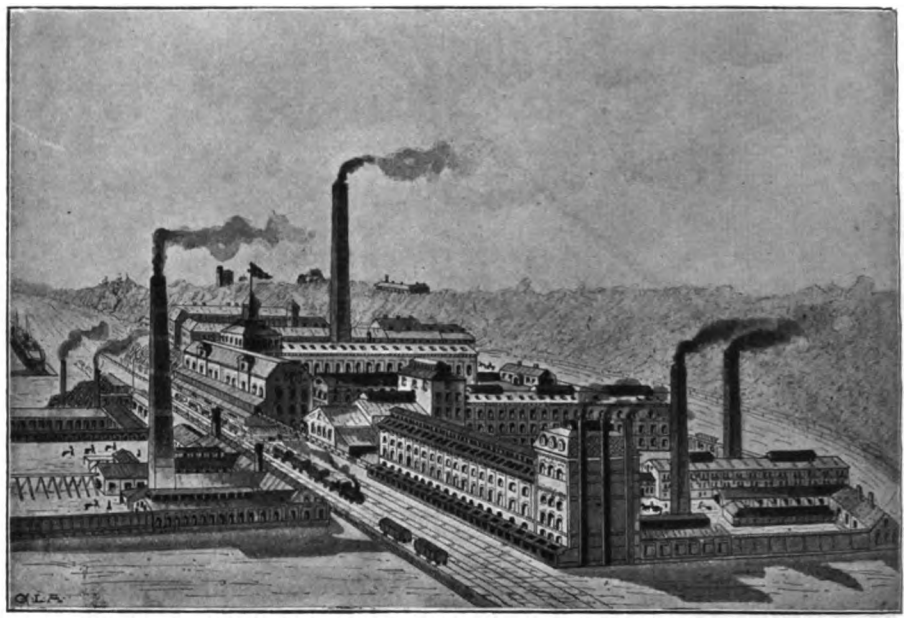

Superphosphate and Sulphuric acid Factory, Helsingborg.

A new form of illuminant has been in use since about 1895: **Acetylene gas.** That gas is now generated by a very simple process, viz. the action of water on *calcium carbide*, that commodity being itself obtained by the reduction of lime and charcoal in an electric kiln. A kilogram (2·2 lbs) of calcium carbide, the manufacture of which at present may be said to cost less than 25 öre (about 3 *d.*), produces about 0·3 cubic meters (somewhat more than 10 cubic feet) of acetylene gas. This new illuminating agent has spread very rapidly, owing to its unrivalled luminosity and the facility with which it can be produced. The requisite electrical power for the manufacture of calcium carbide is ready to hand at a very cheap rate in the numerous Swedish waterfalls, and as far as one can now judge there are excellent prospects of a production of this illuminant on a large scale in Sweden; unfortunately, in this case as in many others, enterprise has been hitherto checked by the incompleteness and uncertainty of the law respecting the rights to turn the waterfalls to account. The new legislation recently gained (see p. 892), is consequently also here very welcome. — In 1897 a calcium carbide factory was established at the Trollhättan falls by G. de Laval (of late transformed in an experimental factory for zinc-smelting). Yet several others have been started since.

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9. CHEMICAL INDUSTRY.

From a technical standpoint this industry has attained a high degree of development in many branches in Sweden, though the actual bulk of turnout is still, as a rule, inconsiderable, which fact is to be attributed to the usual difficulties with regard to exporting from Sweden.

The establishments coming under the heading of chemical industry are classified as follows in the official factory statistics, and the number of factories and of workmen and also the value of production amounted in 1900 to:

	Factories.	Workmen.	Value of Production.[1]
Inorganic acids, bases, and salts	32	291	2,550,000 kronor.
Fertilizers etc.	72	921	5,234,000 »
Explosives	19	664	3,349,000 »
Dyes and miscellaneous preparations	133	768	4,152,000 »
Total	256	2,644	15,285,000 kronor.

Under this heading the match-making industry might also have been included (cf. above, page 822). The number of factories, if that be taken into account, would be as many as 276, the number of workmen 8,746, and the value of turnout 25,230,000 kronor.

There seems to be every chance of Sweden making considerable advance in the future with regard to chemical industry. In *certain branches* development has been checked by the circumstance already referred to, that hitherto, with us, attention has been centered round inorganic chemistry rather than *organic* — caused by our rich supply of minerals, even of relatively rare kind. Naturally, this does not mean that organic chemistry has been neglected in Sweden, this country being, as well known, among the most prominent with regard to chemical researches. But, with us, immediate impulses have been wanting to a wider study of the most important part of organic chemistry — aromatic chemistry — inasmuch as the chief raw material, (coal and) coal-tar, is almost lacking in Sweden. And, moreover, the complete laboratories required for modern organic chemistry, are more easily to be had in wealthier countries.

Sulphuric acid.

Sulphuric acid is usually produced in conjunction with the preparation of superphosphate, for which it is directly required. It is also used in large quantities in the production of hydrochlorid acid, nitric acid, and in stearine candle factories, factories making explosives and German yeast, and for many other purposes. In 1900 there were 7

[1] A krona = 1·10 shilling or 0·268 dollar.

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sulphuric acid manufactories, employing 39 workmen and with a turnout of 351,082 quintals, valued at 989,000 kronor.[1] Between 1870 and 1880 the annual turnout was only 40,000 quintals, in the next decade 112,000 quintals, and in 1891/1900 326,447 quintals. The import in 1900 was 18,538 quintals, valued at 185,000 kronor; the export was not worth mentioning. There was an import in the same year of no less than 201,516 quintals of sulphur and flowers of sulphur, at a value of 1,814,000 kronor. In the quinquenniums from 1861/65 to 1896/1900, this same import amounted to respectively 1,705, 2,740, 3,190, 8,726, 14,085, 32,730, 72,208, and 131,171 quintals per annum.

Chlorate.

Chlorate is an indispensable ingredient in matches, certain fireworks, and particular kinds of gunpowder; since the electrolytic method was known it has been manufactured in Sweden, the electric current required being generated from waterfalls. The first chlorate factory, and probably at the same time the first electrochemical establishment in Sweden, was founded in 1893 at the instigation of Director *O. Carlson* by the Stockholm Superphosphate Manufacturing Co., Ltd., at *Månsbo*, Avesta, on the banks of the river Dalelfven, close to one of the waterfalls in its course. The electric current sets chloric gas free from a chloride of alkali, whereupon, by acting upon alkali hydrate, it forms alkali chlorate. In 1900 there were two factories, employing 215 workmen, with a turnout valued at 797,000 kronor.

At *Bengtsfors* a factory was established in 1895 for the manufacture of **caustic soda** and **hypochlorite of lime.**

The import of chlorate of potash and of soda amounted in 1900 to 3,683 quintals, at a value of 221,000 kronor, the export being assessed at 724,000 kronor.[1]

Artificial Fertilizers.

The manufacture of fertilizers containing phosphoric acid in the form called **superphosphate** commenced about the year 1871; this industry has since then attained considerable dimensions. Though there occur in Sweden both conglomerate and apatite containing phosphate of lime, which afford, when sufficiently purified, a suitable raw material for the production of superphosphate, it has proved necessary to import large quantities of raw phosphate, chiefly from America, to supply the needs of the Swedish factories. The phosphates of lime obtainable from Florida, Carolina, and other recently discovered localities are to be had in Sweden at prices which forbid all competition from home sources. On the other hand, there exist in Sweden excellent possibilities for the

[1] A quintal = 1·97 cwts. A krona = 1·10 shilling or 0·268 dollar.

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rise of an extensive manufacture of **Thomas-phosphate**; the iron-ores containing apatite, that occur in many places, especially at Grängesberg and Gellivare, when worked by the basic Bessemer process, yield phosphate as a by-product in and along with the slag. It was not, however, until 1892 that this process was applied at Domnarfvet for the production of iron from the Grängesberg ores. In 1900 there existed 3 factories making Thomas-phosphate, the total turnout amounting to 13,031 tons. It is very problematical if this figure can be much exceeded, for the demand for Thomas-iron in the country will soon be fully satisfied. Some years ago (1897) attempts were made to turn the apatite which occurs so plentifully in the Gellivare ore to advantage, without producing Thomas-iron at the same time; Professor *J. Wiborgh* is the originator of this process, which consists in subjecting the crushed ore to a magnetic enrichment, after which the apatite separated off is finely pulverized and smelted together with soda. The product thus obtained got the name of **Wiborgh-phosphate**, which in quality proved able to compete with both Thomas-phosphate and superphosphate. A factory engaged in the production of it was established at Svartön near Luleå, but this production is now discontinued.

There exist in most provinces of Sweden a number of larger and smaller factories and bonegrinding mills making **bone-dust** or **bone-manure**. Besides bone-dust there is manufactured at some of them bone-fat, bone-glue, and bone-charcoal.

In years when the herring fishery is favourable, some part of the herring is devoted to the preparation of **herring-oil** (see above, page 813) and **herring-guano**; the process is to heat the herrings till the oil is secreted, after which what is left is pressed; the substance so obtained goes by the name of fish-guano. This industry is pursued in Göteborg och Bohus Län; in 1897 there were no less than 17 factories engaged in it, their turnout being worth 1,064,000 kronor, of which 778,000 kronor was for guano. During some of the last years, however, this industry has been greatly impeded by reason of the poorness of the herring fishery.

Some towns, for instance Stockholm, Gothenburg, and Karlstad, have established **pudrette factories** for using up refuse profitably. The total value of the manufacture, however, in 1900 was only about 116,000 kronor.

Figures relating to the manufacture of artificial fertilizers and to the import and export of them will be found above on page 516.

Explosives.

The manufacture of ordinary **black gunpowder** was known as early as the beginning of the 15th century. Black gunpowder is produced from charcoal, sulphur, and potassium-nitrate. Sweden possesses natural

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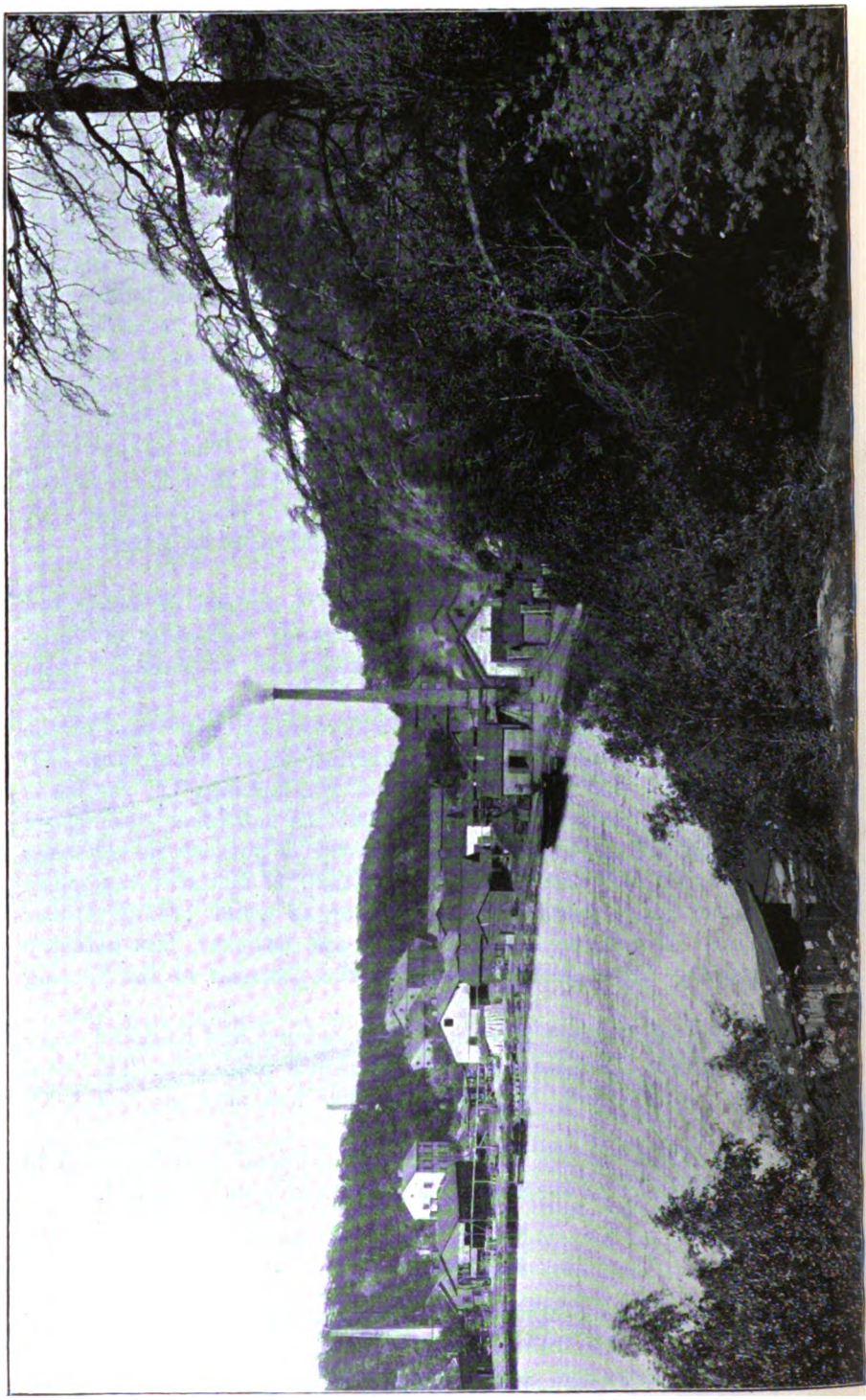

The Vlaxström Dynamite Factory, near Stockholm.

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supplies of charcoal and sulphur, but potassium-nitrate has to be obtained artificially by soaking it out of the soil under stables and cattle sheds and mixing it for the purpose with potash. The production of potassium-nitrate was also effected by means of special potassium-nitrate boxes, as they were termed, in which a mixture of soil, ashes, and urine was duly turned over in such a way as to yield a tolerably large quantity.

In previous times, since the age of Gustavus Vasa (1523/60), when the manufacture of gunpowder became a national concern, the State levied so to say a *saltpeter tax* on all land; at first this took the form of a right to the disposal of all saltpeter soil under cattlesheds etc., out of which State-appointed saltpeter-makers were required to boil the saltpeter for the use of the government gunpowder factories; later on, the landowners had to provide the saltpeter themselves or pay an equivalent money fine. From 1815/93 the country was divided into so many saltpeter-making districts for the management of the business connected with the levying of the tax etc., each district being under a director; at first the number of districts was 13, but it gradually dwindled, till at length, in 1883, only the Vesterbotten district remained. The manufacture of saltpeter, in 1811/66, was under the supreme superintendence of a committee appointed for the purpose, subsequently of the artillery branch of the Military Department. In 1893 the State relinquished all concern with the manufacture, and at present probably none is made in the whole country, the small requirements of the commodity being supplied by import from abroad, principally from Germany.

In the meantime, the manufacture of explosives has entered upon a new phase; the year 1864 marks a new epoch in the technics of explosives, for it was then that the famous *Alfred Nobel* established the *Vinterviken* dynamite factory, near Stockholm, the oldest of its kind in the world. The effective ingredient in **dynamite** is nitroglycerine, and this substance, obtained by treating glycerine with strong nitric acid, is far cheaper and far more efficacious than ordinary gunpowder. By mixing nitroglycerine with infusorial earth, a solid explosive substance is obtained, which is less dangerous to handle, and it is this which is called dynamite. Nitroglycerine can also be combined with other explosive agents, giving rise to a number of explosive substances with differing qualities, suited for various purposes. Some of these combinations are: **sebastine** and **ammoniac-gunpowder.**

Another very violent explosive is **guncotton** or nitrocellulose, obtained by treating cotton with strong nitric acid. Nitrocellulose can also be combined with nitroglycerine; the former then swells out or becomes gelatinized in the nitroglycerine. A gelatinized composition of that nature is called **blasting gelatine** or **gum-dynamite;** if the gelatinizing process be carried out in a suitable manner, the composition, subsequent to drying, can be compressed into a horny, elastic substance, far less dangerous than guncotton to handle, but quite as effective in use.

Gelatinized and compressed guncotton is employed in the production of **smokeless,** or more properly almost smokeless, varieties of gunpowder. The fact of the matter is that the combustible ingredients of nitro-

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glycerine and guncotton consist solely of uncoloured gases; this is naturally of immense importance, more especially in war. Since 1890 smokeless powder has been used by the Swedish army. The first variety, called apyrite, was manufactured by *Skoglund*, a Swede, but subsequently the smokeless powder called Troisdorf gunpowder, from the German factory where it is made, has been adopted in the Swedish army and is now produced at the government powder-factory of *Åker*. This gunpowder consists merely of guncotton that has been gelatinized by the admixture of alcohol and ether; it occurs in the form of small glittering scales. For cannon and torpedoes, where a more violent effect is needed, a gelatinized mixture of nitroglycerine and nitro-cellulose is employed, called after its inventor **Nobel gunpowder** or ballistite.

It is no exaggeration to say that Sweden has contributed in a very extraordinary degree to the development of the technics of explosives during the past forty years; it has even been termed »the classic land of modern technics of explosives». Besides Alfred Nobel's inventions, dynamite and Nobel gunpowder, both epoch-making, the former as a blasting agent, the latter as a powder for war purposes, there are several other explosive agents, both effective and almost free from danger in usage, which trace their origin from Sweden. It will be sufficient to mention here: **bellite** invented by *C. Lamm* (with its improvement: bellona), principally consisting of dinitro-benzole; this substance is as free from danger in ordinary handling as wax, even in contact with red-hot metals, nor does it explode if exposed to the influence of water; but if once given a powerful fulminate lighting, it displays a very considerable explosive power.

Among explosives are also to be reckoned *match-cord*, *percussion-caps* and *cartridges*, and also *fireworks;* the latter are chiefly manufactured to supply the needs of the army.

All kinds of explosives, both for public and private requirements, are made in the country, the manufacture approximately meeting the total demand as the import and export are about equal in amount.

The following figures afford a general idea of the progress of this industry in Sweden since 1866:

Average.	Factories.	Workmen.	Value of Production.[1]
1866/70	1	40	129,000 kronor.
1871/75	2	124	498,000 »
1876/80	5	127	599,000 »
1881/85	6	116	613,000 »
1886/90	5	141	648,000 »
1891/95	10	225	910,000 »
1896/00	12	326	1,836,000 »
In 1900	11	394	2,702,000 »

In 1900 there were, besides, 4 *match-cord* and *fuse factories* employing 16 hands; the total turnout was valued at 72,000 kronor.

[1] A krona = 1·10 shilling or 0·268 dollar.

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Ammunition and cartridge factories were also to be found to the number of 4, employing 254 workmen and turning out wares to a total value of 575,000 kronor.

The Swedish Government possesses one powder-factory, Åker, in the Län of Södermanland, already mentioned, and two ammunition factories: Marieberg, near Stockholm, and Karlsborg, in the Skaraborg Län.

Dyes.

No coal-tar or aniline dyes are made in Sweden, but manufactures are carried on out of the aniline and other dyes that are for the most part imported into the country such as: drop-colours, colours soluble in spirits or water, and colour compositions, which can be directly applied to the dying of both cottons and woolens. Of the colouring matters obtained in Sweden itself may be mentioned: lamp-black, reddle, chalk, umber or ochre of different shades, zinc-white, white lead, cobalt blue, and vanadic salts for black colour.

Lamp-black is prepared by an incomplete combustion of resin, wood, and the refuse from resin, tar, and pitch manufacture, the soot thereby formed being collected.

Reddle, consisting of oxide of iron, is obtained as a by-product in the working of copper pyrites and in the burning of alum schist. After being washed in a weak solution of glue and green vitriol, reddle is employed very largely for coating over the outsides of timberbuilt houses; it is regarded as being very durable and very instrumental in preserving wood. The reddle from the Falun copper mine has long enjoyed a high reputation.

Fire-proof paint is prepared in such a way that it deposits on anything coated with it a layer of silica which is neither ignitible nor fusible, and hence protects the wood beneath it from the danger of fire. This kind of colouring matter can be prepared either with the aid of water-glass or by stirring silicious marl or finely ground asbestos in ordinary water-colours.

The total number of factories under this general heading in 1900 was 46, employing 130 hands. The turnout was valued at 872,000 kronor.

With regard to *coal-tar* or *aniline dyes*, see page 815.

Other chemical-technical factories.

Of the products of these factories may be mentioned: *writing-ink*, *carbonic acid*, *fruit-tinctures*, *aseptine* and other *antiseptic* agents, *hair-oils*, *pomades*, *lanoline*, *lactic acid*, *sealing-wax*, etc. Of the older, better known manufactures may be mentinned *Henrik Gahn's Amykos-aseptine*, in which boric acid and peppermint-oil are the most efficacious ingredients; of more recent ones we may for instance mention *Stomatol* and *Salubrine*, in the former of which terpineol, in the latter acetic ether plays the most important part. Amykos-aseptine is, as well as stomatol and salubrine, a preparation invented in Sweden.

A new industry in Sweden is the manufacture of fluid **carbonic acid;** it dates from early in the nineties and is now carried on at three factories, two at Löfholmen near Stockholm and the third, recently started, at Limhamn in Skåne. The total turnout in the year 1900 was 4,148 quintals à 1·97 cwts.

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10. METAL AND MACHINE INDUSTRY.

This large group, in technical respect the most important of the whole Swedish industry, can for the year 1900, according to accessible, official statistics, be divided in the following way:

	Factories.	Workmen.	Production, value.[1]
Iron and steel-goods	545	19,146	60,769,000 kronor.
Other metal-works	288	3,946	17,791,000 »
Vessels and boats	72	5,059	10,195,000 »
Carriages and vehicles	64	2,768	11,486,000 »
Machines and implements	401	24,213	64,451,000 »
Instruments	64	924	2,342,000 »
Clocks and watches	7	166	319,000 »
Total	1,441	56,222	167,353,000 kronor.

It ought to be remembered, that the manufacture of the raw material, iron and steel or other metals, is not included here, it having previously been treated under the heading of Mining.

Already before the great revolution in industry, which was brought about by the invention and perfection of the steam-engine in the end of the 18th century and its introduction here in the beginning of the 19th century, several Swedes had made themselves noted in the machine-industry of that time, both for theoretical works and for practical applications, a thing of which one is reminded by such names as *Polhem*, *Rinman*, *Nordewall*, *Broling*, and others, which line of eminent names receives a worthy termination with that of the highly meritorious mineralist *P. Lagerhjelm*, through whose invention (1826) of a machine for the testing of iron and steel the birth was given to the nowadays generally introduced mechanical tests of material, the importance of which for all sorts of architecture and consequently also for the machine-industry in general cannot be overrated.

An independent machine-industry in the sense of the present time was not then to be found with us, but it was coupled together with the production of the most important raw-material, the iron, and its first refining, and consequently transferred to the iron-works. Considerable mechanical works were by and by established at several of these places; but the present machine-industry, with all modern, technical expedients, originally dates from the time when the steam-engine commenced to be more generally used and the tool-making machines (invented in England) for the manipulation of iron were introduced here, and after that time several Swedes as *John Ericsson*, *Carlsund*, *Palmcrantz* (mitrailleuse), *L. M. Ericsson* (telephonic apparatus), *Per Persson* (knitting-machines), *A. Lagerman* (machines for the match-industry), *J. G. V. Zander* (motorpathic apparatus), *Jonas Wenström* (electric

[1] A krona = 1·10 shilling or 0·268 dollar.

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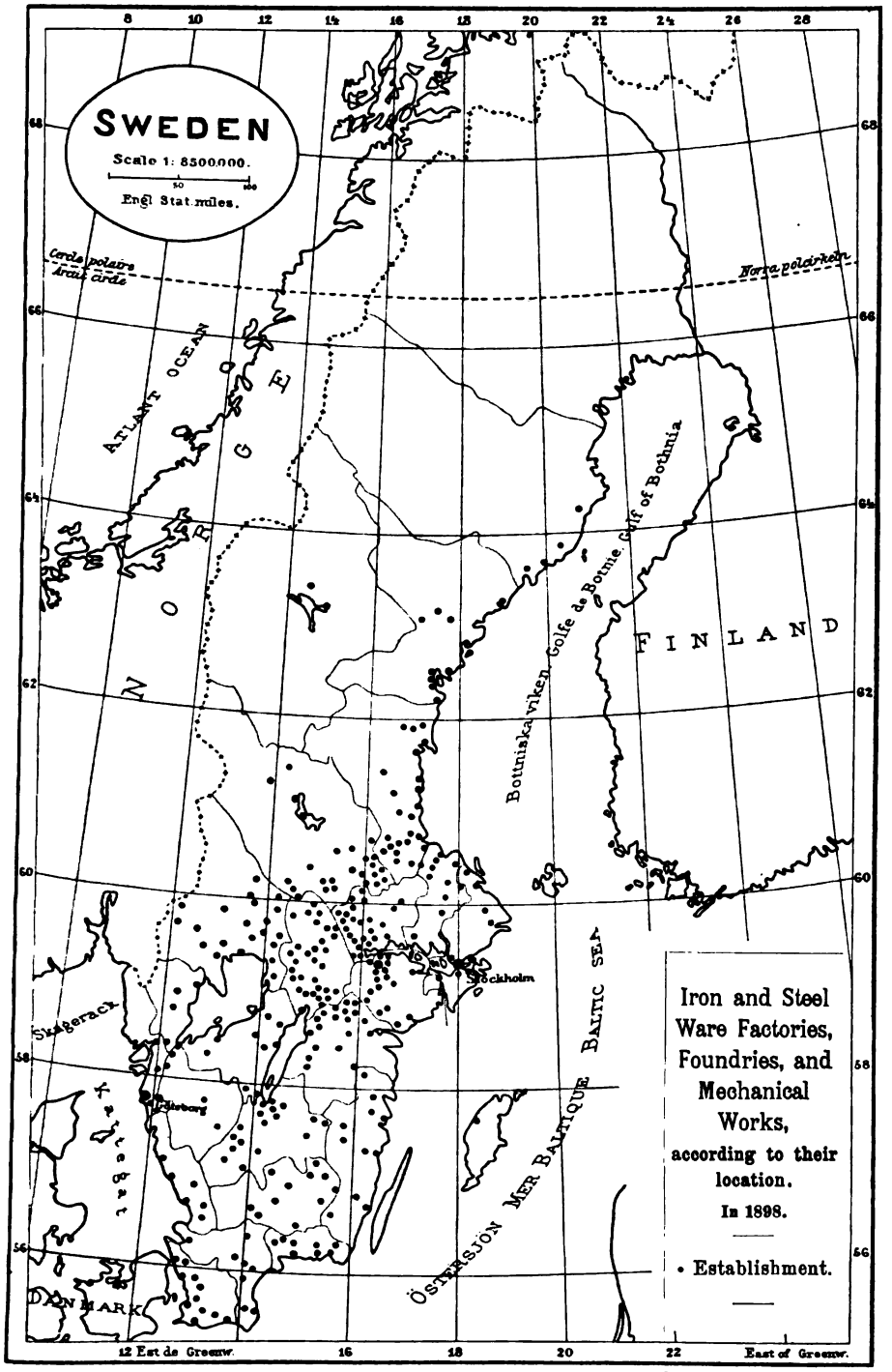

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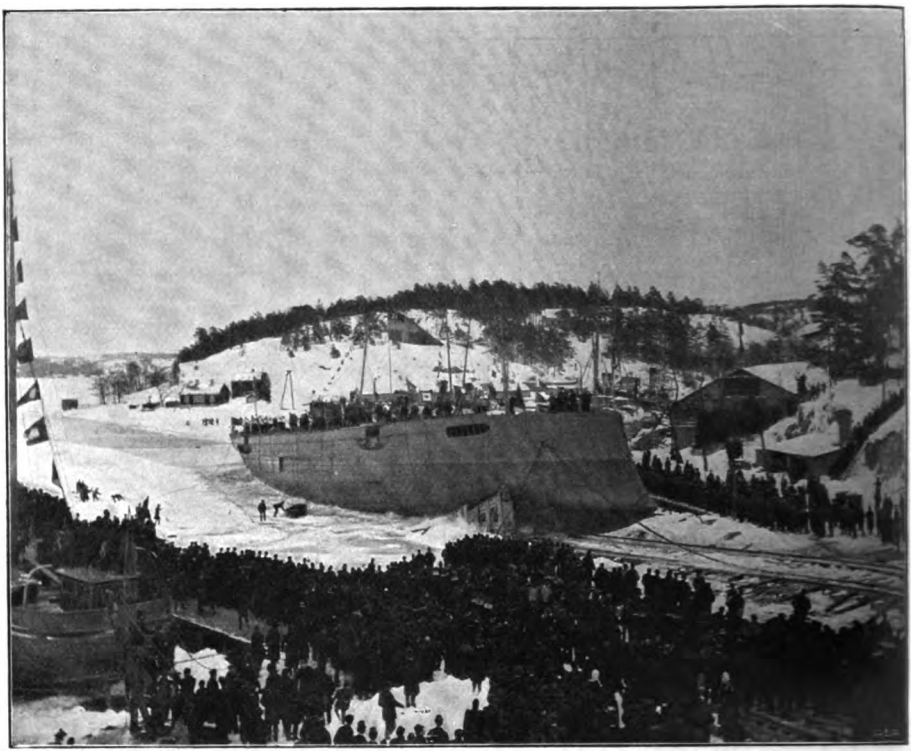

Launching of the Iron-clad the Thule at Finnboda.

apparatus), *de Laval*, the brothers *Hult*, and others have invented machines of great value.

The most important branches of the machine-industry are the *mechanical works* and the *foundries*. These are to a great number scattered all over the country, especially in the coast-towns and at such places in the country from which the communications are facilitated by means of lakes, canals, and railways. At the choice of situation for a mechanical work regard has also often been paid to an existing waterfall, the fertility of the surrounding country, the proximity to larger factories such as spinning-mills, cloth-manufactories, paper-mills, etc. Up to about forty years ago new mechanical workshops were built principally for the purpose of repairing and of furnishing coarser castings for agricultural and factory-wants. To be able to give the employees regular employ, these *repairing works* had before long to devote themselves to *special manufactures*, which still as a rule did not consist of other things than those used in the country and particularly in the nearest environs. Within the last few decades an essential change has, however, set in, inasmuch as not only old mechanical works have been altered, but also many new ones have been built and fitted out with the best, most suitable ma-

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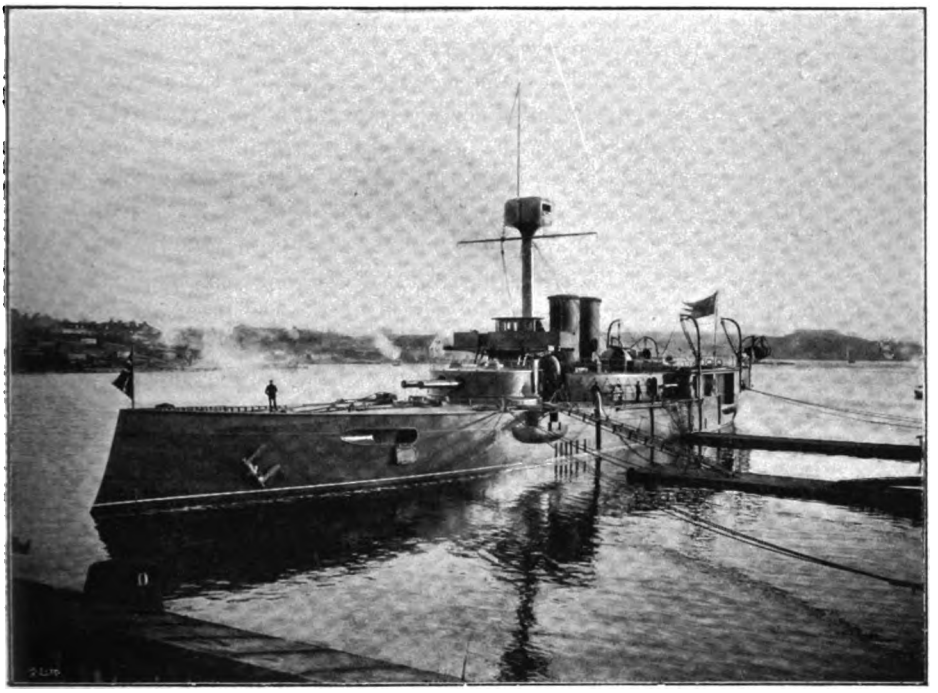

Iron-clad on the water.

chines, with the purpose of being exclusively used for special manufactures, with the applying of the newest and cheapest working systems. In the last mentioned respect, there deserves to be mentioned a more general use of casting-machines in the foundries and grinding-machines and figuring-lathes when that can be conveniently done, to avoid the more expensive work on lathes and planing-machines. Finally, important improvements have in many establishments been effected concerning the working itself, through the application and distribution of the motive power in partly hydraulic, partly pneumatic, and partly electric way, the introduction of electric light, etc.

Swedish mechanical works have successfully competed at most of the great international and other industrial exhibitions, and carried well deserved prizes, and nowadays it is not an uncommon thing for foreign engineers and other traders to visit our larger establishments for the purpose of study.

According to official statistics the value of production for iron- and steel-manufactories, foundries, and mechanical works amounted in 1900 altogether to 113,799,000, and has during the last decade more than doubled. It ought, however, to be observed that in these sums are also included the value of rolling-mill products, such as bar-iron, sheet-iron, wire, pipes, rails, etc. Some particulars with regard to the

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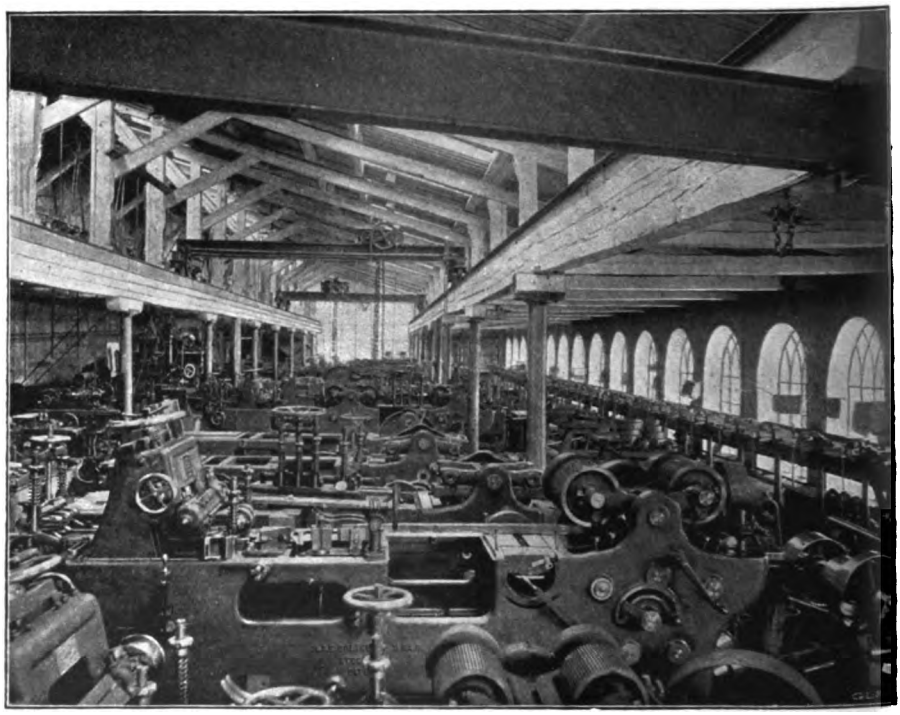
manufacture, as also with regard to the imports and exports are given on page 867, and in the Tables 127 and 128 below.

It is noticeable, that the relation, with regard to the quantity of production, between the different centers of machine and metal-ware manufacture has during the last years not inconsiderably changed. Gothenburg has for instance shown a remarkable stagnation while Stockholm has made great progress; the same is the case with Norrland, and also with Malmö and surrounding places. This latter circumstance finds its explanation in the strong revival of industry in general in Skåne, which is favoured with a particularly fertile soil, highly suitable also for the beet-root sugar industry, as also with a not inconsiderable supply of coal and diverse raw-materials, as fire-clay, etc. A steady development of the metal industry has for years been going on in Eskilstuna and its surroundings, suggesting that the industrial products special for this town, begin to gain ground on the world market.



From the Bolinder Works in Stockholm.

With regard to Swedish machine-industry in general, a still greater development in the immediate future may be anticipated than the one we have witnessed during the last few decades. In fact, the progress has for a number of years been enormous, even surpassing the great

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development which followed, with us as elsewhere, during the first few years after the French-German war, or in the beginning of the decade 1871/80. Also then the fires in the furnaces of machine-industry blazed livelier than ever before, but then this liveliness depended in much principally on foreign capital, which overflowed when the dams burst that the war had built against it. Towards the end of the same decade a decline set in also with us, so that several new-built establishments had to stop business or change owners, and older and larger establishments, leading a languishing life, had to be reorganized. The rise, which in the decade of 1891/1900 entered in our machine-industry, may also be founded principally on the favourable conjunctures on the world-market, but it seems though, more than the above mentioned development, after 1870, to be based on the natural resources of the country itself and thus can be expected to justify the hope of a longer subsistence.

Of more remarkable articles which in the official manufacture statistics are brought together under the two headings Metal works and Vessels, carriages, machinery and implements — which are not always so easy to distinguish from each other — the following show the highest **value of production** in 1900[9]:

Articles.	Value, kronor.	Articles.	Value, kronor.	Articles.	Value, kronor.
Div. metal wares..	13,066,377	Pipes.....	2,632,665	Gold and silver[5]..	1,322,182
Div. iron wares ...	13,048,129	Plate-vessels.....	2,525,714	Reaping-machines[6]	1,198,219
Railway-carriages[1]	10,775,801	Tin-wares.....	2,336,335	Div. motors[7].....	1,077,897
Vessels and boats..	10,195,538	Steam-boilers	2,138,896	Thrashing machines	993,492
Electric machines[2]	9,006,926	Velocipedes.....	1,764,025	Sewing and knitting-machines ...	923,500
Dairy machines....	8,019,693	Knives.....	1,514,712	Bobbins	879,299
Nails.....	5,381,355	Hob-nails	1,421,307	Saw-blades[8].....	792,997
Thin-sheet iron[3]...	4,383,327	Guns	1,408,480	Portable engines ..	704,500
Div. steam-engines[4]	3,301,891	Rifles	1,400,463	Horse-shoes.....	603,730
Railway-engines ...	3,254,200	Ploughs, etc.	1,397,998		
Drawn wire.....	2,672,109	Projectiles.....	1,326,987		

The whole quantity of *castings* was estimated to no less than 16,094,682 kronor, and *operators and implements* — of which part are entered above — were manufactured for a value of altogether 20,634,892 kronor, of which 12,112,639 kronor were for machinery and implements in the service of agriculture. — Concerning instruments, clocks, and watches, see page 862 as well as the special articles below.

Concerning the **imports and exports** of hereunto belonging articles, a summary is given in Table 127. On the whole this table testifies to good progress for our metal and machine-industry, although the imports are, however, still considerably preponderant. The enormously increased machine import in the latter half of the nineties is one of the often recurring testimonies of the strong industrial rise of these years.

[1] Including tramway-cars. — [2] Dynamo-machines, telephones, telegraph-apparatus, etc. — [3] Including sheet-iron. — [4] Except locomotives and portable engines. — [5] Wares of. — [6] Including sowing machines. — [7] Gas, mineral oil, caloric engines, etc. (steam-engines not included). — [8] Including material for saw-blades. — [9] A krona = 1·10 shilling = 0·268 dollar.

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TABLE 127. *Imports and exports of metal wares, machinery, and instruments, etc.*[1]
Value in thousands of kronor.[2]

Wares.		Average 1871/75.	Average 1876/80.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1900.
Iron- and steelwares	Imp.	6,846	5,070	7,290	8,979	10,556	17,148	19,083
	Exp.	1,458	1,285	4,227	4,111	4,735	7,983	9,909
Other metal works.	Imp.	2,680	2,779	4,961	5,097	7,287	8,720	9,626
	Exp.	79	105	109	138	244	1,094	1,107
Vessels and boats ..	Imp.	340	96	348	754	1,330	5,699	6,836
	Exp.	—	55	25	762	937	613	202
Carriages	Imp.	222	88	59	224	124	287	272
	Exp.	17	68	238	27	41	18	18
Machinery, implements and tools..	Imp.	11,555	7,679	8,903	10,612	11,059	23,321	23,057
	Exp.	1,137	1,386	2,483	2,738	4,076	9,155	11,580
Instruments	Imp.	571	395	1,037	1,148	1,865	2,525	2,642
	Exp.	18	13	23	88	331	1,758	2,489
Clocks and watches[3]	Imp.	1,373	1,780	2,167	2,407	3,116	3,376	3,484
	Exp.	10	2	4	4	9	10	12
Total	**Imports**	**23,587**	**17,887**	**24,765**	**29,221**	**35,337**	**61,076**	**65,010**
	Exports	**2,719**	**2,914**	**7,109**	**7,868**	**10,373**	**20,631**	**25,317**

The imports and exports of iron- and steel-wares embrace a large number of different articles, of which only some few amount to a greater value. Of imported goods we thus notice rails with accessories to a value in 1899 of no less than 9·44 million and, in 1900, of 5·68 million kronor. Of exported goods we notice pipes and parts of pipes of iron and steel to a value of 3·02 million kronor in 1900. The import and export of machinery, implements, and instruments are more specified for the year 1900 in Table 128, page 869, which is disposed with regard to the headings of the Customs tariffs; it offers several details of interest.

To explain the present position of machine-industry, the following statements are given concerning some of the **largest establishments** of the country.

First among Swedish factories, not only with regard to its annual production value, but also with regard to the considerable circulation its products have gained, stands at present the **Separator Co., Ltd.,** for which we have accounted above, as for other factories of dairy-machines, under the heading Dairies and Dairy-farming, p. 586. The honour of having brought this manufacture, within such a short time, to so considerable a height, jointly belongs to the inventor of the separator-machines Dr. *G. de Laval*, and the energetic economic leader of the business *J. Bernström*. The company also has branch-establishments in Hamburg, in Austria, Hungary, and Denmark; and in America the patent-right of the company is held by The de Laval Separator Co., Ltd., in New York, in which company Separator has great interests. The factories of the American Company are situated in Poughkeepsie.

[1] The distribution approximately corresponds with the one used in the tabular summary on page 862. — [2] A krona = 1·10 shilling = 0·268 dollar. — [3] Including pieces of clocks and watches.

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TABLE 128. *Imports and exports of machinery, implements, and instruments in 1900.*[20] (A krona = 1·10 shilling or 0·268 dollar).

I. *Not specified machinery and implements.*[18]	Imports. Kronor.	Exports. Kronor.
A. Motors not electric.	266,591	188,115
B. Operators:		
First group[1]	1,157,034	173,872
Second group[2]	2,919,448	339,804
Third group[3]	211,337	439,692
Fourth group[4]	1,850,180	168,829
Fifth group[5]	159,725	5,065
Sixth group[6]	2,298,933	721,277
Seventh group[7]	210,831	8,464
Eighth group[8]	1,374,394	57,668
Ninth group[9]	1,552,992	6,326,190
Tenth group[10]	171,011	283,898
Eleventh group[11]	1,290,045	48,174
Twelfth group[12]	3,687,560	962,198
C. Tools	935,004	368,415
Total I	**18,085,085**	**10,091,661**

II. *Specified machinery and implements.*[14]	Imports. Kronor.	Exports. Kronor.
Engines and squirts[15]	74,535	60,503
Electric incandescent lamps	249,643	67,694
Gas and water-meters	225,159	990
Shovels and spades, etc.	62,726	23,771
Sewing and knitting machines	1,409,822	111,902
Saws, saw-blades, etc.	111,285	89,510
Railway engines[16]	553,235	11.000
Velocipedes	1,846,787	63,955
Steam-engines[19]	398,019	1,058,507
Other	50,488	321
Total II	**4,981,699**	**1,488,158**
III. *Instruments.*		
Surgical, etc.[17]	625,736	2,432,517
Optical[18]	769,650	29,015
Musical	1,000,686	27,242
Other	245,981	80
Total III	**2,642,053**	**2,488,854**

The **Kockum Mechanical Works Co., Ltd.,** with foundry, workshops, and shipyard in Malmö, manufacture steam-boilers, steam-engines, railway-carriages, men-of-war and merchant vessels, machines for sugar-works, etc., with a value of products of about 2,700,000 kronor, and employ about 1,000 workmen. The foundry and the mechanical works were founded by *F. H. Kockum* 1840/41. The business was in 1866 taken over by a joint-stock company, which enlarged it with a shipyard.

The **Bergsund Mechanical Works Co., Ltd.,** owns, besides foundry and works on Södermalm in Stockholm by the Mälaren, also a slip-dock at *Finnboda*, near Stockholm on the Baltic. The Bergsund mechanical factory is among the oldest in Sweden. It was founded already in 1769 by a Scotchman, Thomas Lewis, in 1807 passed over to an Englishman, G. D. Wilcke, whose leading engineer during three years was the famous *Samuel Owen*. After some change of

[1] For production and use of electricity, except physical instruments. — [2] For dressing of metals. — [3] For refining of wood and similar materials. — [4] Wood-pulp, paper, printing, bookbinding, and match-industries. — [5] Leather, india rubber and glue industries and hatting. — [6] Textile industry. — [7] Cereal-mill, oil-pressing, chocolate, bakery, and comfit-industries. — [8] Sugar, starch, yeast, malt liquor, mineral water, and margarine manufacture. — [9] Agriculture. Of the import the greatest amount (1,195,115 kronor) goes to sowing- and reaping-machines, of the export, 5,862,387 kronor to separators, etc. — [10] Stone, clay, cement, and glass industries and peat preparation. — [11] Lifting and pressing, blowing-machines included, such as derrick-cranes, lifting-jacks, pumps, etc. — [12] Other purposes than preceding groups. — [13] Machinery, implements, and tools not specified in the Customs tariffs. — [14] In the Customs tariffs specified machines, implements, and tools. — [15] Water-engines and garden-squirts. — [16] The import of locomotives exceptionally that year ran up to the said amount, because the Swedish factories were not able to execute all orders received. — [17] Surgical, mathematical, physical, chemical, and navigation instruments. — [18] Including telescopes, opera glasses, spectacles, barometers, manometers, and thermometers. — [19] Including steam-boilers; but not locomotives. — [20] Sections I and II in this Table together correspond to the group Machinery, implements, and tools in Table 127, page 868; and section III to the group Instruments in the same Table.

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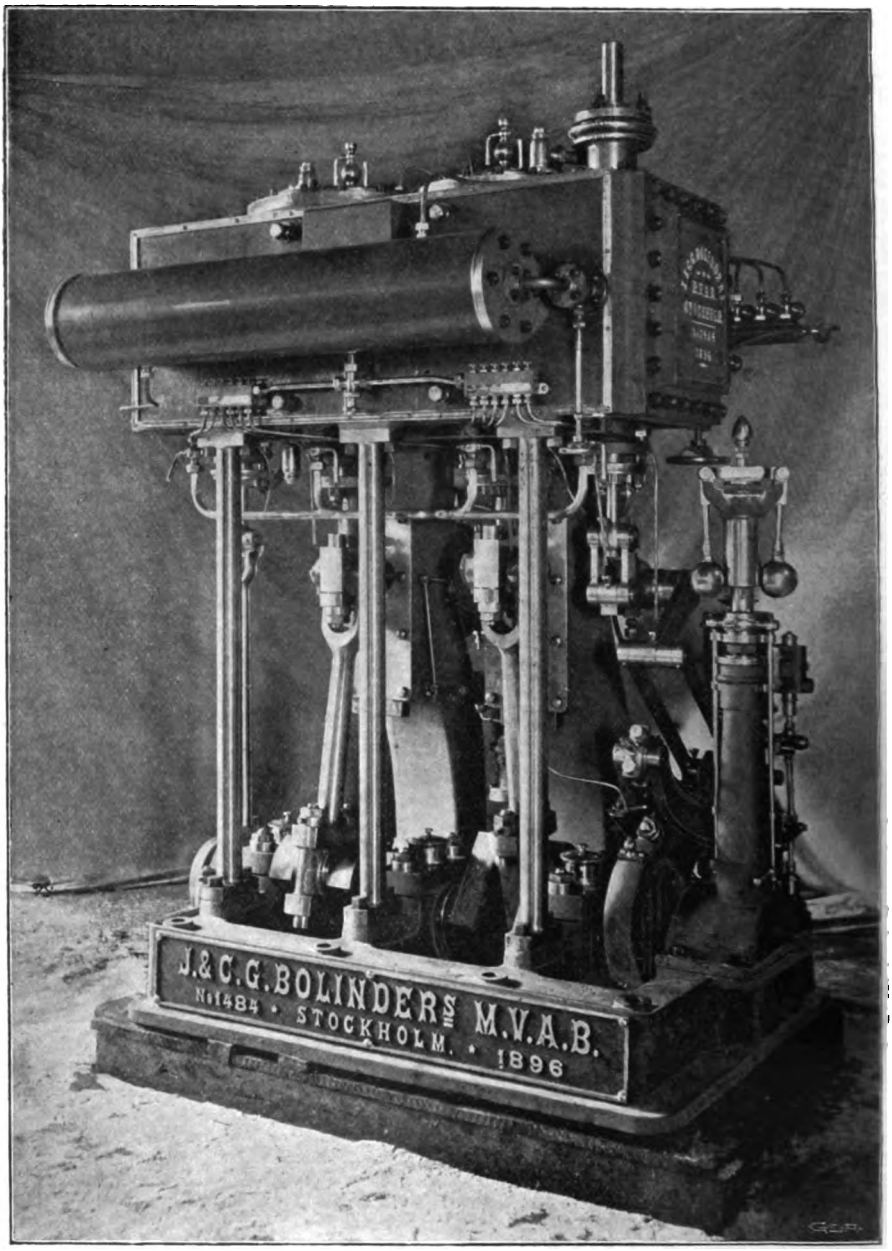

Vertical compound steam-engine with expansion gear controlled by the governor.

owners the factory was bought, in 1858, by Mr. A. W. Frestadius and by and by developed into its present high position under the direction of Mr. *E. A. Öllman*, C. E. The most important manufactures are steamers and railway-bridges, also all sorts of machinery, castings, and sheet-iron works. Most of the Swedish

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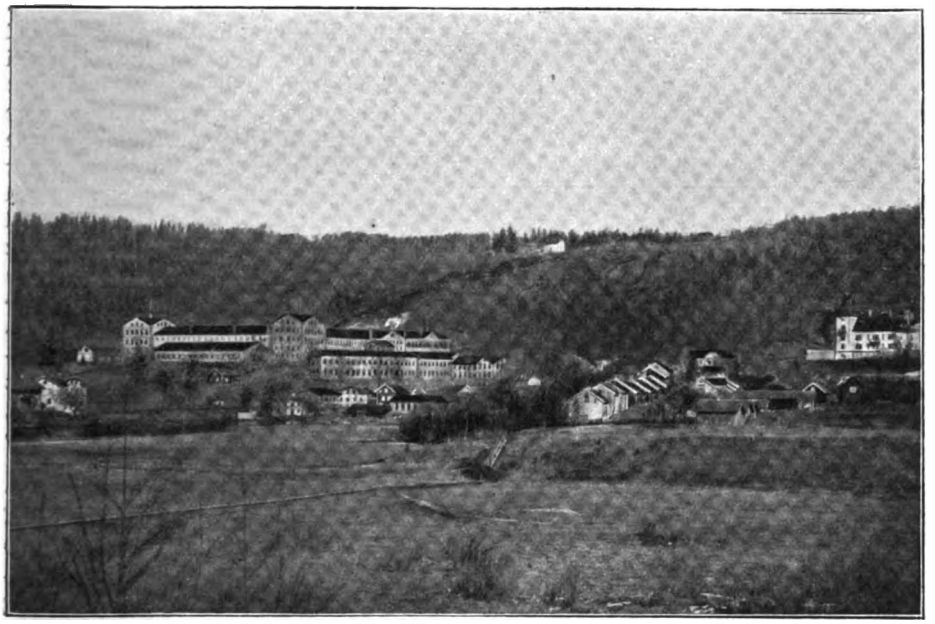
State railway-bridges are supplied by the Bergsund mechanical works. At Finnboda slip-dock iron-clads are also built. The value of products for the Bergsund mechanical works together with the Finnboda slip amounts to about 2,400,000 kronor yearly, and the number of workmen to about 1,200.

The **Atlas Works.** This magnificent establishment was founded in Stockholm in 1873, principally for the manufacture of locomotives and other railway-material, for which there was a large demand at that time, and which also caused a very rapid development of the business. But when, after some years, the conjunctures became bad, it had to be reorganized, and the new joint-stock company, which took over the Atlas works in Stockholm, has ever since shown much vitality. Objects of manufacture are locomotives and other railway and tramway-material, tool-machines, steam-boilers, and steam-engines of up to several hundred horse-power, apparatus for bathing- and laundry-establishments, parts of hot-air conduits, etc. The value of products is about 3,000,000 kronor per annum, and the number of workmen about 800.



Huskvarna.

The **Bolinder Works,** which are now owned by J. & C. G. Bolinder's mechanical Works Co., Ltd., were founded 1845, in Stockholm, by the brothers *Jean* and *C. G. Bolinder*, and has now, after a steady development, risen to be one of the most important establishments of the country in its branch. Steam-engines of all sizes are manufactured there, petroleum-motors after the Weyland patent, steam-boilers, saw-mills, tool-making machines of different kinds, highly praised wood-planing machines, and cleave-saws after the Westman patent, stoves, ranges with patented safety apparatus, even of the largest size for hotels and large passenger steamers, boilers and other material for conservatories, ornamental castings, etc. — The whole yearly value of production amounts to about 2,600,000 kronor, and the establishment employs about 900 hands.

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Huskvarna Sewing-machine.

Huskvarna, on the river of the same name, near Jönköping, dates from long ago. Originally it was founded (1680) to be a State rifle-manufactory, but was in 1757 made over to private persons and has since experienced several changes, till it now is owned by a joint-stock company (1867). The manufacture principally consists in sewing-machines after the Singer system with alterations and improvements, bicycles, shooting-rifles, stoves, and other cast articles. The yearly value of products is about 2,900,000 kronor, and the number of hands about 1,100.

The **Trollhättan Foundry and Mechanical Works,** at the celebrated Trollhättan falls, the first real locomotive factory of Sweden, were founded in 1847, principally for the manufacture of castings, etc., for mills, saw-mills, mining, etc., as well as turbines, which last article still continues to be a specialty of this factory. Under the firm of *Nydqvist & Holm*, they rapidly developed, and in the beginning of the decade 1871/80 the manufacture of locomotives was introduced, which has remained another specialty for the establishment. The works will nowadays be able to turn out one locomotive a week. A good deal of tool-machines used in the fabrication are made at the factory itself. Besides turbines and locomotives also pump-works for the water-conduits of towns, iron bridges, etc., are manufactured there. The yearly value of products is about 2,000,000 kronor and the number of hands about 800.

The **Motala Mechanical Works,** at one time the largest industrial establishment in Sweden, situated at the point where the Göta Canal discharges itself into lake Vettern, were founded in 1823 by the Göta Canal Company under the supervision of the Englishman *Daniel Fraser*, rapidly developed under skilful management, and were fitted out with the best tool-making machines for manufacture in nearly all branches of iron-refining, as merchant-steamers, men-of-war, dredging-machines, locomotives, steam-boilers, wheels for railway carriages, sheet-iron, shapes, rails, wheel- and cannon-bands, etc. During the time the owners also incorporated other mechanical works, shipyards, and iron-works with the chief business at Motala, but were obliged, owing to unfavourable conjunctures, in the end of the decade 1881/90 to reorganize the business, when the original works were taken over by a new joint-stock company (1892). The manufacture, which some years previously had been languishing, has now entered on a new phase of high briskness. Especially the locomotive manufacture has gone forward. This was commenced already in 1861; it is true that, in 1865, it was abandoned, but ten years later it was again taken up. Under the present owners, the manufacture has amounted to an average of 12 locomotives per annum, but has of late increased so much that at present it will have reached a four-double capacity of delivery, or of one locomotive a week. At the side of this chief product, there are blooms and ingots manufactured, as well as bar-iron, rolling-wire, thin sheet-

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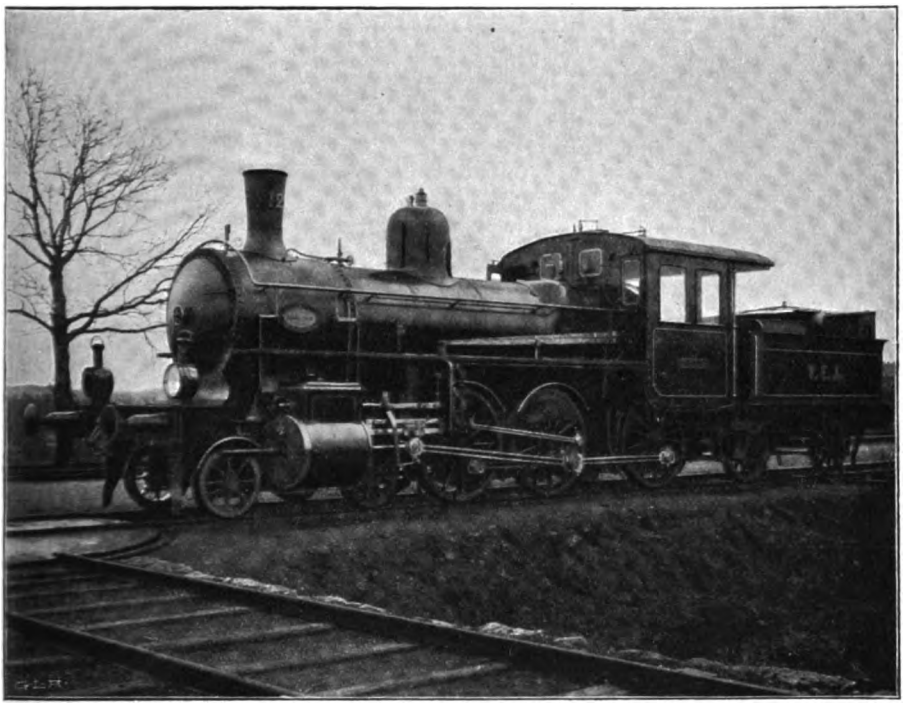
iron, large engines for men-of-war and merchant-steamers, turbines, steamers, railway- and other bridges, diverse iron- and metal-castings besides. The number of workmen employed is about 1,150. In association with *the Lindholmen Mechanical Works* (with slip- and dry-dock), near Gothenburg, orders for iron-clads are also executed.

The **Carl Holmberg Mechanical Works** in Lund have during the last few decades worked their way up from a modest beginning as repairing workshops to a forge for real great industry. The most important manufactures are dairy-implements, peat and brick-making machines, steam-engines and castings. The whole output is valued to 1,600,000 kronor per annum, and the number of workmen is about 350. — The same firm also owns **the Armature factory** in Lund, the largest of its kind in Sweden, for the manufacture of taps, valves, steam-whistles, etc.



Locomotive from Nydqvist & Holm, Trollhättan.

The **Göteborg Mechanical Works** with branches in the town of Gothenburg and at Lundby on the island of Hisingen, near Gothenburg, were founded in 1841 by Alexander Keiller, a manufacturer immigrated from Scotland, under whose successful direction they rapidly developed and were in 1867 taken over by the present joint-stock company. Objects of manufacture are steamers, steam-engines, even of considerable size, steam-boilers, cranes and elevators, caloriducts, railway carriages, iron bedsteads, diverse castings, etc., to a total value of about 2,027,000 kronor. The number of hands is more than 800.

The **Lindholmen Mechanical Works,** slipways, and drydock at Gothenburg were founded 1851 by *Th. Tranchell* then sold and united with the Motala Works in 1858. In 1892 the works were reconstructed by their present owners, the

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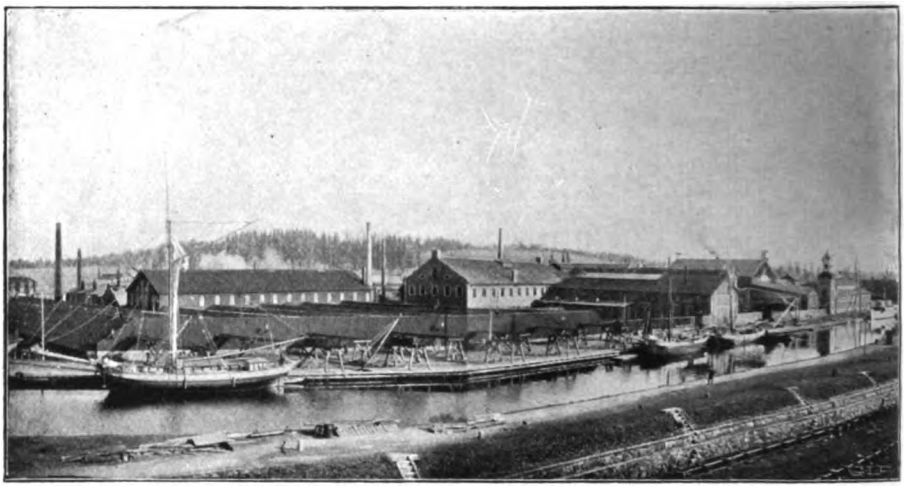
joint-stock company of Lindholmens Verkstads Aktiebolag. Superintended by *Carl Norrman* and later by *Sven Almqvist*, the works have grown successfully to become a large shipbuilding yard of first order. Objects of manufacture are: iron-clads, torpedo- and gunboats, passenger- and cargo-steamers of all sizes, steam-engines and boilers, likewise repairing of them, etc. Value of production about 1,800,000 kronor. Number of hands at present about 700.

The **Munktell Mechanical Works** at Eskilstuna were founded in the beginning of the decade 1831/40, by *Johan Teofron Munktell*, by and by developed, and in 1859 were completed through the building of the *Klosterström* foundry. At this factory steam-engines for large industrial works have been manufactured, the first Swedish railway locomotive, the first home-made machines for rifle manufacture on a large scale, machines for wood-pulp manufactories, etc. At present the principal manufacture is portable engines, steam-boilers, thrashing-mills, steam-dredging-machines, tool-machines, etc. Value of production about 1,600,000 kronor per annum. The number of hands amounts to about 550.



The Motala Mechanical Works.

Stora Varfvet (The Southern Dockyard) in Stockholm, belonging to the W. Lindberg factory and dockyard joint-stock company in Stockholm, was founded by *William Lindberg* in 1853, who then took over »the Great Shipyard of the town», which is still rented by the new company, that besides owns properties at Tegelviken near Stockholm. The company owns a floating dock and the business includes everything that concerns the building and repairing of iron-vessels, lighters, steam-engines, boilers, lifting-jacks, pumps, etc. that can be considered to belong to a mechanical factory and dockyard business. The total yearly value of production is about 1,500,000 kronor. The number of hands 550.

The **Karlstad and Kristinehamn Mechanical Works,** owned by a joint-stock company at Karlstad, manufacture steam-launches, turn-benches for iron rolling-mills, machines for wood-pulp and paper industry, portable engines, railway carriages and other railway material, etc., with a production value per annum amounting to about 1,500,000 kronor for the two establishments. The number of workmen is about 500.

The **Ludvigsberg Mechanical Works** in Stockholm, founded in the middle of the nineteenth century by *S. L. Lamm*, now owned by a joint-stock company, also

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From the Motala Mechanical Works.

exercise a great activity in manufacturing air-stoves, ventilators, refrigators, pumps, steam fire-engines, etc. The yearly value of production is about 1,000,000 kronor; the number of workmen exceeds 400.

The **Falun Carriage factory** and the **Södertelge Works** exercise a great manufacture of railway and tramway carriages; the latter factory also produces motors and motor-cars.

The activity of above mentioned establishments is, nearly without exception, directed to manufactures which are not to be subjected to any further manipulation, but have to be considered as completed products, and the same applies to most of the so-called mechanical works, of which the above-mentioned only can be considered as some few of the most important. Besides these, there are many establishments, which, together with mechanical workshop business, also carry on business in the shape of extraction of metals from the ore and their first refining processes. These establishments, usually called **iron works, brass-forges,** etc., mostly possess large woods and landed properties, etc., besides which their mechanical works often are of greater importance than many of the real mechanical works of the country. As examples of such establishments, we will here mention some few.

Domnarfvet, in the parish of Stora Tuna, at the Bergslagernas railway and on the river Dalelfven, about 20 kilometers from Falun in Dalarne. These iron Works,

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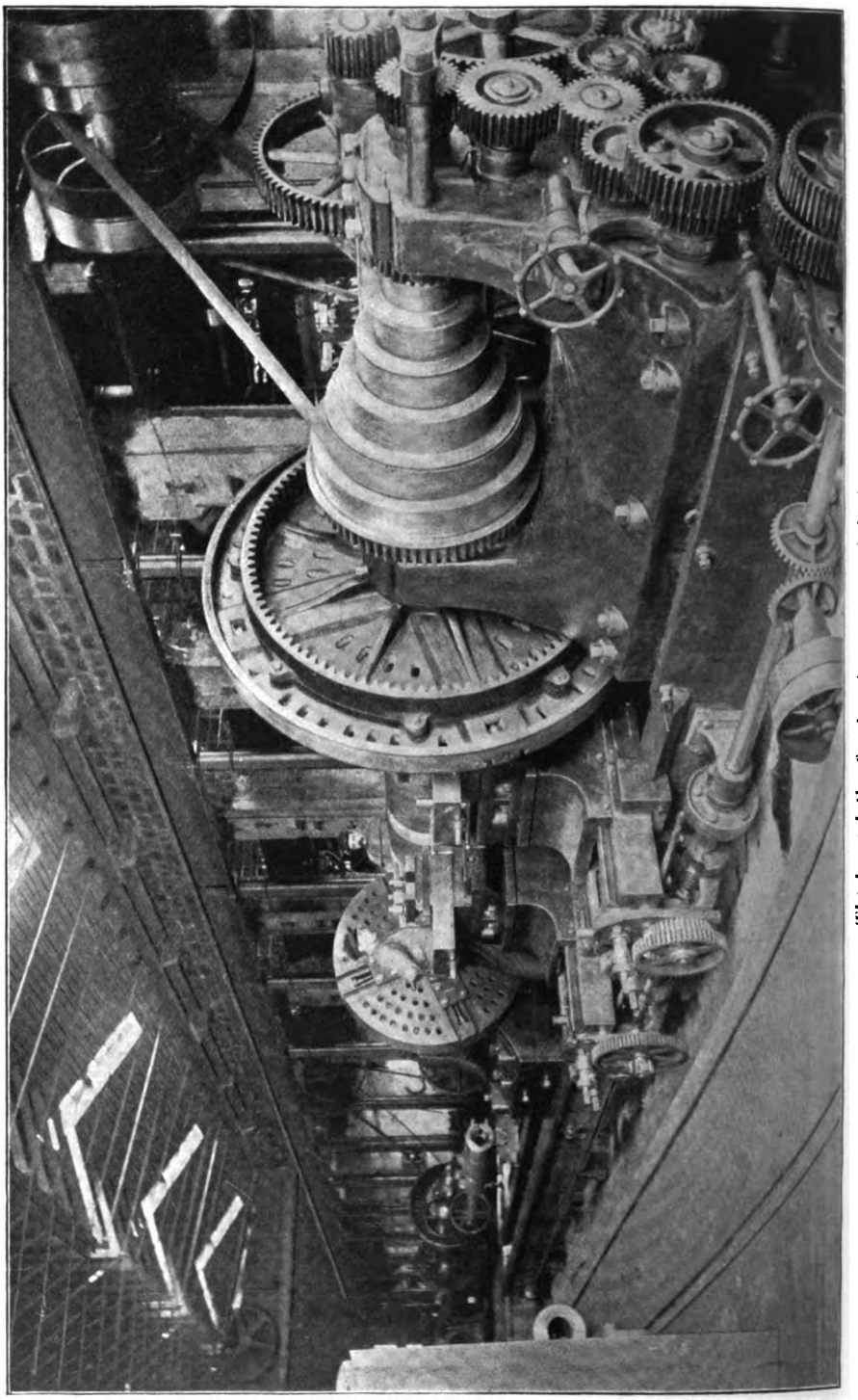

The large lathe for turning cannons at Bofors

which are the largest in their way in the North of Europe, were founded about 1875, are owned by the great company of Stora Kopparbergs Bergslags Aktiebolag (see p. 756), and include the following chief divisions: a) smelting division with 4 smelting-houses, 7 regenerative heating apparatus, 6 roasting-furnaces, 3 pounding-mills, 3 blast apparatus, etc.; — b) the Bessemer works with 5 converters, blast apparatus, hydraulic power-generating works and thomasphosphate works; — c) the Martin works with 4 furnaces of 15 tons, two for basic and two for acid martin; — d) the rolling-mill department with ingot works, rail and heavy works, continous wire and universal works, fine and medium works, thick and thin sheet-iron works, etc.; — e) manufacture forge; — f) mechanical works; and — g) coaling department with 8 coal furnaces. The annual output is about 43,000 tons of pig iron, 39,000 tons of rolling-mill products (rail, bar-iron, wire and sheet iron), nails, horse-nails, etc. The number of workmen is about 2,400.

The **Sandviken Iron Works,** in the province of Gestrikland, were founded in 1862, by the famous *G. F. Göransson*, who through his improvements in the Bessemer process first rendered the same of practical use (cf. page 732). The works are now owned by a joint-stock company and are on account of their excellent products well-known all over the world. The establishment consists at present of 3 smelting furnaces, 4 Bessemer converters, forge-hammers, several rolling-mills, wire-drawing mills, manufacture forge, foundry, mechanical workshop, etc., and manufactures bessemer steel ingot, bar-iron (rolled and forged), tube billets, large shafts, anchors, rolled wire, hoop-iron and horse-nail rods, shaped iron and steel, wheel-band, saw-blades, drawn wire, coldrolled band-steel and diverse manufactures for a yearly value of about 1,400,000 kronor. The number of workmen is about 1,700.

The **Bofors Iron Works,** situated in the parish of Karlskoga in Örebro Län, include iron-works with smelting-furnaces, 2 Martin furnaces, Lancashire forges, rolling-mills, iron-manufacture and mechanical works, etc. At Björkborn and Bofors they manufacture blooms, ingots, rolled bar-iron, rolled wire, war material, as guns, projectiles, etc., and diverse steel castings (screws, etc.). The number of workmen amounts to about 700.

The **Finspång Iron Works,** which are now owned by the joint-stock company of Aktiebolaget Finspångs Styckebruk, were known as early as in the 16th century. Besides the chief establishment at Finspång in Östergötland, a lot of landed properties, mines, saw-mills, etc., belong to the same company. It is renowned especially on account of the manufacture of guns and other war material, in which at a time it was foremost in this country. At present, besides various sorts of welding-iron, also cut nails, goods-vans, ploughs, etc. are manufactured.

The **Fagersta** Iron Works in Vestmanland manufacture, besides real rolling-mill products, also saw-blades, springs, drawn wire, steel-ropes, etc. The **Lesjöfors** Iron Works in Vermland manufacture hoop and horse-nail iron, drawn wire, and ropes. The **Hagfors** Iron Works in Vermland manufacture tube billets, wood-screws, horse-nails, and frost-nails. The **Surahammar** Iron Works in Vestmanland manufacture shafts and wheels for railway-carriages. The **Kolsva** Iron Works in Vestmanland manufacture various steel castings, as screws. The **Hallstahammar** bolt Factory in Vestmanland manufactures exclusively bolts, nuts, fish-plates, and rivets. The **Iggesund** Iron Works in Gefleborg Län manufacture saw-blades, chisels for planes, stone and mine-implements. The **Ankarsrum** Iron Works in Kalmar Län manufacture projectiles. The **Skultuna** Brass-forge in Vestmanland, founded already in 1611, owned by the joint-stock company of Skultuna aktiebolag, manufactures copper- and brass- plate and wire, and, besides, brass tubes, bolt and pipes, etc., amounting to a value of 1,700,000 kronor per annum; it employs 380 workmen. The **Granefors** Copper and Brass factory, Blekinge, with plate rolling-mills, wire works, etc., manufactures plate pipes, bar-copper, wire, etc., to a yearly value of about 600,000 kronor.

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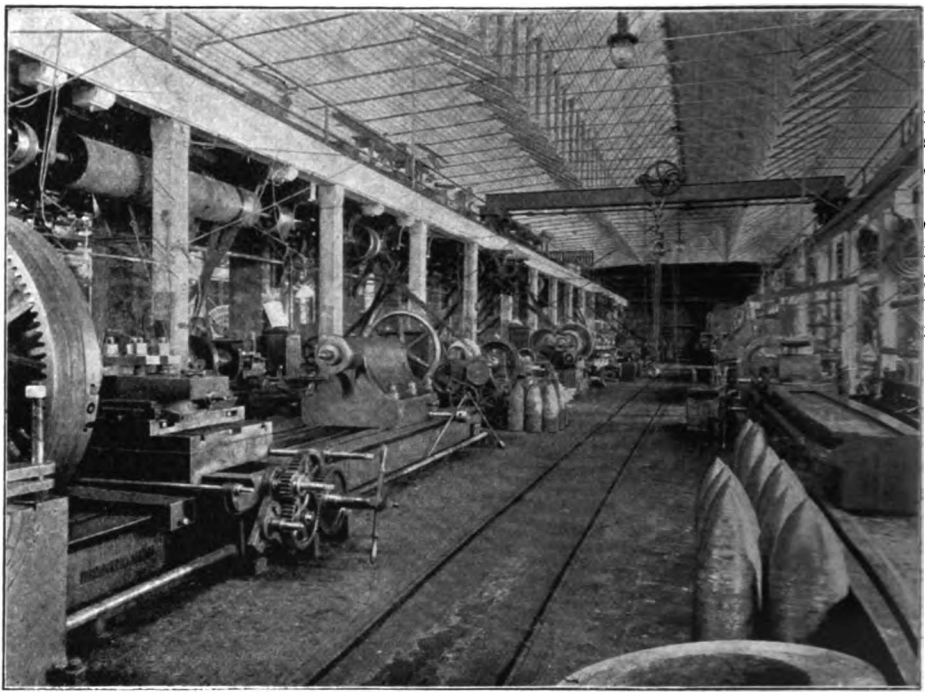

From the Bofors Works.

From the above, which only concerns the conditions at some few of the larger establishments, it will, however, be seen that, within the country everything *can* be manufactured that is nowadays employed in the way of machines and tools, etc., of what name and use it may be, either in war or peace, from large battle-ships and the heaviest guns to the smallest tool-making machines and tools for the refining of metals, wood, textile articles, etc., and for agriculture. In fact, there are only very few articles which are not manufactured in the country. As examples of such we may mention spinning-machines and power-looms, etc., within the textile branch, large printing-machines, calendering and cotton-printing machines, and some few others.

The difficulties which Swedish machine-industry has to overcome, are firstly the previously mentioned, or the lack of mineral coal and cheap cast-iron; then the fact that, owing to the great extension of the country, the number of mechanical works, particularly repairing works, has grown larger than is required, on account of which the competition has become keener, so much the more as most of our works do not intend export of their wares to foreign countries. The fact that our metal industry is thus divided on a large number of often small workshops and factories scattered over a wide area, is in social respect

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The Halda Watch Factory.

of considerable advantage, inasmuch as the agitation and disquietness and the annoyances, which often arise between employer and workmen in countries with a more concentrated machine-industry, are with us of scarce occurrence and more easily settled, as a rule without leaving deeper traces of dissatisfaction or indignation.

As **examples of manufactures** in which Swedish factories have shown themselves **able to take up competition with the foremost ones of foreign countries,** we may mention the following, though the list is by no means complete. Among those that we are going to mention, are several founded on Swedish inventions, as de Lavals separators and steam-turbines, Salenius' radiator, Jonas Wenström's threephased dynamo, the small portable petroleum-stove »Primus», Hult Brothers' rotatory steam-engine, the Svea velocipede, and many others.

Steamers: * Bergsund and Stora Varfvet (Stockholm), Kockum (Malmö), **Motala,** Lindholmen, Göteborgs mekaniska verkstad, Eriksberg and Torskog (Gothenburg), Oskarshamns mekaniska verkstad, Karlstads mekaniska verkstad, and Jönköpings mekaniska verkstad. — **Railway engines:** Trollhättan, Motala, Atlas, Helsingborgs mekaniska verkstad. — **Portable engines:** Munktell (Eskilstuna), Torp (Moeda), Kristinehamns mekaniska verkstad, Vulcan (Norrköping),

* English for some Swedish expressions often used below: *Aktiebolag* = joint-stock company. *Mekanisk verkstad* = mechanical works. *Gjuteri* = foundry. *Fabrik* = factory. *Bruk* = iron works. *Järnverk* = iron works.

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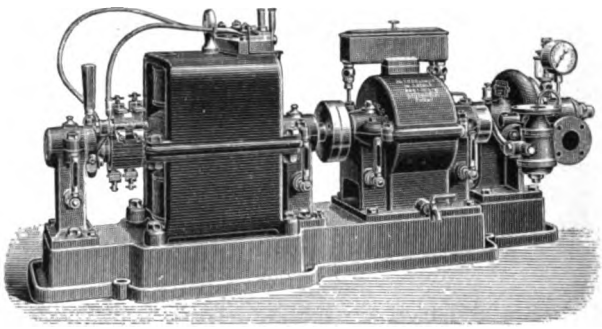
Fole (Visby). — **Velocipedes:** Aktiebolaget Palmcrantz & C:o (Svea velocipedes, Birger Ljungström's patent), Aktiebolaget Velox (Trelleborg), Wiklund, Per From (Stockholm), Humber & C:o (Malmö), Huskvarna, Gefle. — **Steam-engines:** all those who build steamers and besides: Bolinder, Atlas, Aktiebolaget de Lavals ångturbin (steam-turbine), Bröderna Hults rotationsångmaskin (rotatory steam-engine), Aktiebolaget Mekanikus (Stockholm), Vulcan (Norrköping), Munktell (Eskilstuna), Söderbloms gjuteriaktiebolag (Eskilstuna), Halmstads gjuteriaktiebolag. — **Petroleum machines:** Aktiebolaget Carlsviks gjuterier, Bolinder, Vulcan (Norrköping), Aktiebolaget Diesels motorer (Stockholm). — **Turbines:** Arboga mekaniska verkstad, Trollhättan, Motala, Vulcan (Norrköping), Halmstad. — **Electric motors** and dynamo machines, etc.: Allmänna svenska elektriska aktiebolaget (Vesterås), Luth & Roséns elektriska aktiebolag (Stockholm).



The De Laval Steam-turbine.

Tool-making machines for the manipulation of **iron and metals:** Bolinder, Atlas, Köpings mekaniska verkstad, Munktell (Eskilstuna), Lidköpings mekaniska verkstad. **Preparation of wood:** Bolinder, Jonsereds fabriker (near Gothenburg), Skövde mekaniska verkstad, Munktell (Eskilstuna), Beronius (Eskilstuna), C. Holmberg (Lund), Torp (Moeda). **Sewing and knitting-machines:** Huskvarna, Per Perssons väf- och stickmaskinfabrik (power-loom and knitting machine factory in Stockholm), Stensholms factory for shoe-making machines (near Jönköping). Machines **for wood-pulp and paper-factories:** Karlstads mekaniska verkstad, Hellefors styckebruk, Lilla Edet, Arboga mekaniska verkstad. **For the peat industry:** C. Holmberg (Lund), Gysinge aktiebolag (Gefleborg Län). **For the match-industry:** Gerhard Arehn (Stockholm), Siefvert & Fornander (Kalmar). **For brickyards:** C. Holmberg (Lund), Svedala (Skåne), Landskrona nya mekaniska verkstad, Halldin & C:o (Örebro). **For dairies:** Aktiebolaget Separator, Centrator, Extractor, Radiator, Svenska centrifugaktiebolaget (Stockholm), Excelsior (Brännudden), Morgårdshammar (Dalarne), Söderbloms gjuteri (Eskilstuna), C. Holmberg (Lund), Ystads gjuteri och mekaniska verkstad, Svedala (Skåne). **For printeries:** Aktiebolaget Mekanikus (Stockholm). **Hoists and lifting machines:** Halmstads mekaniska verkstad.

Sugar-refining machines: Kockum (Malmö). **Distilling apparatus:** Svedala (Skåne), Ljunggren (Kristianstad). Apparatus **for breweries:** Ludvigsbergs verkstads aktiebolag, W. Wiklunds verkstäders aktiebolag, verkstaden Rapid (Stockholm). **Fire extinction materials:** Ludvigsbergs verkstads aktiebolag, Aktiebolaget de Lavals angturbin, Bolinder, fabriken Brännudden (Vaxholm). **Railway carriages** and other railway and tramway material: Atlas, Göteborgs mekaniska verkstad, Falu vagn- och lokomotivfabrik, Kockum, Karlstads mekaniska verkstad, Helsingborgs, Landskrona, Södertelge, and Ljunggrens verkstad (Kristianstad). **Mill-gearing:** Hessleholms gjuteri och mekaniska verkstad (Skåne), Arboga mekaniska verkstad, Morgårdshammar (Dalarne), Söderbloms gjuteriaktiebolag (Eskilstuna).

Agricultural implements in general: Öfverums bruk, Kallinge järn- och manufakturverk. *Mowing, reaping,* and *sowing machines:* Arvika verkstäder, Morgardshammar (Dalarne), Rottneros bruk (Vermland). *Thrashing machines:*

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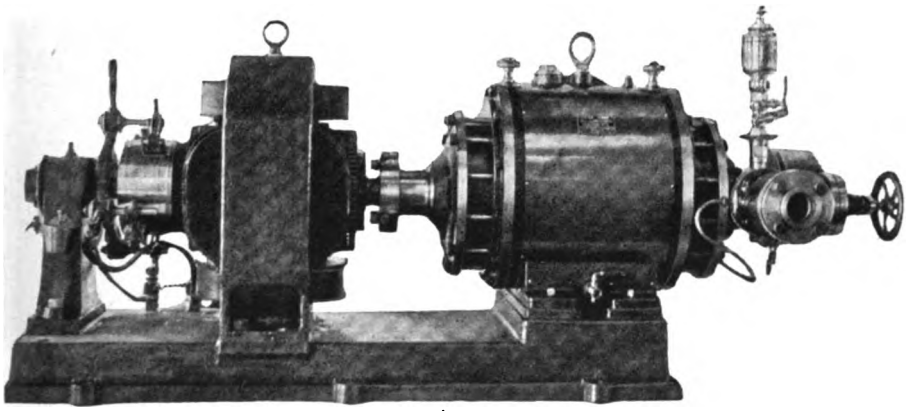
double-winnowing and sorting: Munktell (Eskilstuna), Thermænius (Hallsberg), Torps mekaniska verkstad (Moeda), Aktiebolaget Andrew Hollingworth & C:o (Örebro). *Horse-rakes:* Kallinge järn- och manufakturverk, Morgårdshammar, Rottneros bruk, Grönkvists mekaniska verkstad (Katrineholm), Stenfors bruk (Småland). *Ploughs and harrows:* Norrahammar (near Jönköping), Finspångs styckebruk. *Spades, shovels, and hoes, etc.:* Vedevågs bruk, Stridsberg & Biörk at Gullöfors (Trollhättan), P. Liljeqvist (Eskilstuna), Canells manufakturverk (Koppoms bruk, Åmot), Katrinefors (Motala), Svängsta manufakturverk (Svängsta). **Saw-blades:** Sandvikens järnbruk, Fagersta, Stridsberg & Biörk (Gullöfors at Trollhättan), P. Liljeqvist (Eskilstuna), Nyby bruk (Södermanland). **Machine-knives:** Gullöfors, P. Liljeqvist (Eskilstuna). **Edge-tools** in general, skates, etc.: Tunafors, C. W. Dahlgrens fabriksaktiebolag, Rosenfors, Stålfors, Hadar Hallströms kniffabriks aktiebolag, Erik Anton Berg, and others (Eskilstuna). Hults järnbruk (Åby). **Wrought-iron for building purposes,** as window fittings, hinges, locks, stove-shutters, etc.: Aug. Stenman, E. A. Næsman & C:o, Lagerbäcks fabriksaktiebolag, C. W. Dahlgrens fabriksaktiebolag, F. A. Stenman, and others (Eskilstuna). **Iron bedsteads:** Svenska järnsängsfabriken, Skandinaviska järnsängsfabriken (Stockholm), Göteborgs mekaniska verkstad, Eriksbergs mekaniska verkstad (Gothenburg). **Acetylene works:** Nordiska acetylenaktiebolaget, C. J. Lundström (Stockholm), Kohinoor (Stockholm), Svenska karbid- och acetylenaktiebolaget (Stockholm, branch in Gothenburg), Aktiebolaget Acetylengasverket Frejr (Gothenburg). **Lamps:** Arvid Böhlmarks lampfabrik (Stockholm), Karlskrona lampfabrik, Örnberg & Anderson (Gothenburg). **Small portable petroleum stoves:** Aktiebolaget Primus (Stockholm), Svenska fotogenköksaktiebolaget, C. R. Nybergs mekaniska verkstad (Stockholm).



Rotatory steam-engine (system Bros. Hult).

Telephone, telegraph, and **fire-alarm apparatus:** Aktiebolaget L. M. Ericsson & C:o (Stockholm), Aktiebolaget telefonfabriken (Stockholm). **Clocks and watches:** Halda fickursfabrik (Blekinge), G. W. Linderoth, F. W. Tornberg (Stockholm). **Umbrella ribs:** See (Gefleborg Län), Grytgöl (Östergötland). **Motorpathy apparatus** according to Dr. Zander's system: Göranssons mekaniska verkstad (Stockholm). **Mitrailleuses:** Palmcrantz & C:o (Stockholm). **Guns:** Bofors, Finspang, etc. **Projectiles:** Ankarsrum. **Rifles:** Huskvarna, Eskilstuna. **Tin-boxes, metal capsules,** etc.: Aktiebolaget Svenska kapsylfabriken (Stockholm). Tinned or enameled vessels of **pressed steel-plate:** Olofström, Kallinge (Blekinge), C. A. Vedholms

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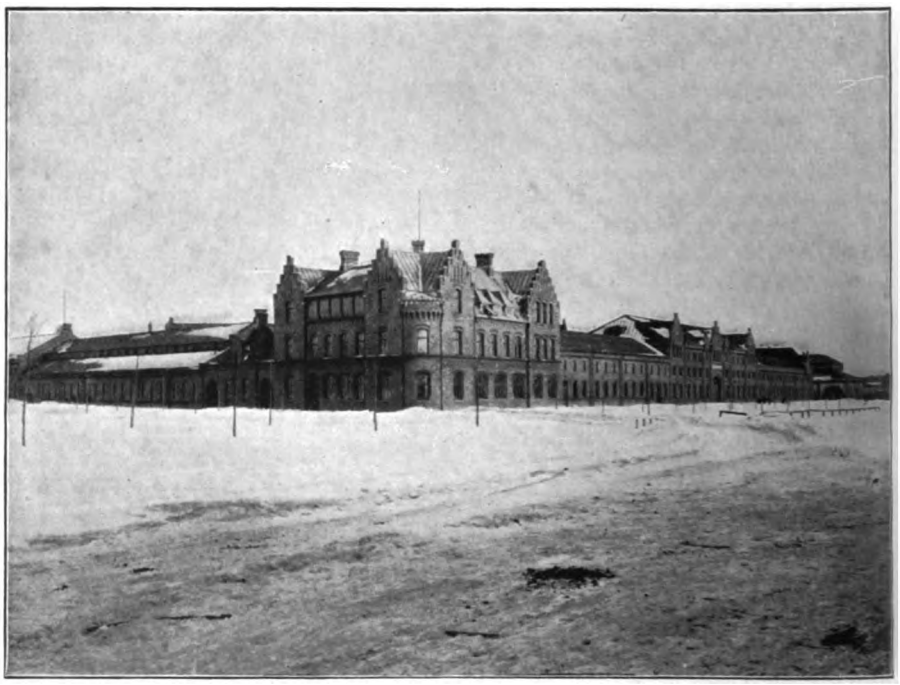
mejerikärlsfabrik (Nyköping). **Calefactors** and heating-stoves of excellent quality are made by many of the larger foundries.

Many of the above industrial branches have developed during the last twenty years and got prizes awarded for their products at world's exhibitions. Their list could be considerably increased, but from the above it is sufficiently proved that the Swedish machine industry already has gone very far in **specializing** its work. In this respect it is also pleasing to note that fabrication is embraced with increasing interest both at new and old *iron-works*, so that many of them supply horse-shoes, horse-nails, nails, chains, steel-ropes, wire, shafts, and all sorts of rolling-mill and wrought iron products of excellent quality.



The General Swedish Electric Company, Ltd., at Vesterås.

The Eskilstuna Industry.

As this town occupies a special position in the iron manufacture of Sweden, we may here give some historical and statistic dates concerning it. A wrought-iron industry, in the real sense of the word, arose there after 1771, when the so-called free-town of Eskilstuna was founded and privileged. The manufacture of wrought iron was up to the last decades carried on principally by hand and in small smithies, but it gained a good reputation and soon found a market even abroad.

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The so-called Eskilstuna work, especially characteristic for that town, comprises manufactures of iron, steel, and other metal, as knives, scissors, hinges, locks, mountings, hooks, and other wrought iron articles for building purposes, files, hammers, tongs, gimlets, saw-blades, pitch forks, spades, house-implements, skates, fancy-goods, etc. The Eskilstuna work has during the last decades more and more developed into great industry, inasmuch as the smithies have been obliged to yield to large factories. New, improved machines have been procured and, only during the last ten years, about twenty new factories have arisen. Among manufactures made of late we may mention household articles of pressed iron, copper, brass, nickel and aluminium, automatic blind-rollers, drawing-instruments and cases of compasses, chisels and steels for planes, rounders and screw augers of American model.

The Tunafors factories at Eskilstuna.

Owing to the efforts of the manufacturers to keep their products on a level with increasing claims on nice appearance and good quality, the country's demand for aforesaid goods can nowadays be satisfied by the home-manufacture. A considerable amount of finer wrought iron articles was formerly imported, especially from Sheffield and Solingen. Eskilstuna has also, and not without reason, been called the Sheffield of Sweden.

The present extent of the metal industry in Eskilstuna and its suburbs (Fors and Kloster) will be seen by the following figures. In 1900 the whole number of factories in question amounted to 105, employing a total of 3,496 workmen, and manufacturing for a value of more than

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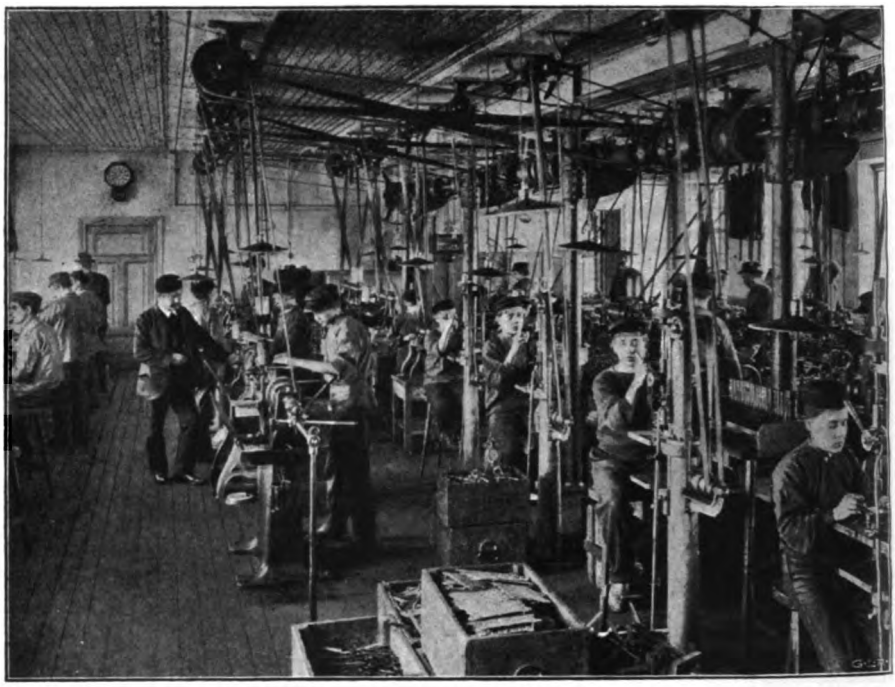

Scissors' Factory at Tunafors.

8,000,000 kronor. Most of the factories are, however, small, so that only for 19 of them does the yearly value of production exceed 100,000 kronor.

Several of the factories also have foundries and mechanical works, so that Eskilstuna on the whole is one of the most important industrial centers of our country. The largest establishments are those of *Munktell*, mentioned several times above, and of *Tunafors*, near the town.

In connection with Eskilstuna, we may here also mention *Karl Gustafs stads gevärsfaktori* (rifle factory), founded in 1814 and situated close to the town. 541 workmen were employed here in 1900, and the value of production amounted to 1,296,016 kronor. Rifles and carabines for the Government's account are manufactured here. Karl Gustafs stads rifle factory and Huskvarna factory of arms are the only rifle factories in the country.

Gold, silver, and tin articles.

The official statistics for 1900 comprise 14 factories for gold and silver manufactures, with 576 workmen and a total value of production of 1,322,000 kronor. Concerning the production of gold, silver, and tin articles in the kingdom, there

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also exist quantitative accounts, dating as far back as 1754, thus farther back than probably in any other country. Already in the middle of the 18th century hall-marking of gold, silver, and tin articles was introduced into Sweden. This hall-marking, which is effected by the *Assay Office*, has during 1754/1900, for the articles manufactured in the kingdom, been effected to the extent shown by the following Table, the quantities being given in kilograms (à 2·204 *lbs*):

Average.	Gold.	Silver.	Tin.	Average.	Gold.	Silver.	Tin.
1754/60.....	10·69	3,302	54,344	1831/40.....	70·73	3,388	10,445
1761/70.....	8·29	2,900	52,408	1841/50.....	88·29	3,811	7,307
1771/80.....	9·74	2,763	51,259	1851/60.....	127·88	4,812	4,780
1781/90.....	19·64	3,476	33,375	1861/70.....	145·19	3,014	2,490
1791/00.....	100·83	5,154	28,148	1871/80.....	259·55	2,570	828
1801/10.....	120·65	3,397	19,953	1881/90.....	292·51	1,630	290
1811/20.....	95·93	3,761	14,277	1891/00.....	464·24	3,282	90
1821/30.....	57·83	3,183	10,713				

During the 147 years of 1754/1900 the hall stamping on home articles has altogether embraced 18,683·01 kilograms of gold, 494,502 kilograms of silver, and 2,744,024 kilograms of tin.

The production af gold and silver articles has in our country of late years made good progress. Among business undertakings within this branch of industry, special mention ought to be made of *Möllenborg*, *Hallberg*, and *Andersson* in Stockholm, *Dahlgren* in Malmö, and *Kjernås* in Gothenburg.

Instruments, clocks and watches.

The manufacture of instruments has attained an extent quite considerable in our country, and even offers export figures that are well worthy of note, as will be seen from the above Tables 127 and 128, pp. 868 and 869.

Of factories for the manufacture of **musical** instruments, Sweden in 1900 possessed 45, with 664 workmen and a production value of 1,719,000 kronor. The organ- as well as the piano factories have attained a very high degree of perfection, and the manufacture of organs has even attained considerable dimensions. Of special factories may be mentioned *J. G. Malmsjö's* piano factory in Gothenburg, and of organ manufacturers *Östlind & Almqvist* in Arvika, *Åkerman & Lund* in Stockholm.

Of **surgical** instrument-makers there are 3, employing 114 workmen and with a production valued at 265,000 kronor. In the section above headed Hygiene and Care of the sick there is an illustration (p. 244) of an operation table made by *A. Stille* in Stockholm, which is considered as being the most excellent of its kind manufactured anywhere.

The make of **scientific** instruments (mathematical, optical, physical, etc.) in Sweden is distinguished by its technical perfection. Several of *Fr. J. Berg's* instruments are illustrated above under the heading of Mining Industry (pages 698 and 705). Weighing instruments of the same manufacturer, constructed by the founder of

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the firm, and highly prized for their handiness and solidity, may also be mentioned. The instrument-maker to the Royal Academy of Sciences, *P. M. Sörensen*, in Stockholm, has manufactured a number of exceedingly fine scientific instruments, among which may specially be remarked *A. G. Theorell's* meteorograph, which registers temperature, barometric condition, and velocity and direction of the wind, by means of an automatic pressure apparatus, giving the result, not by curves, but with ordinary figure types. The apparatus, which is one of the most marvelous of inventions, has come into use in several countries; but, on account of the considerable expense involved in its manufacture, its coming into wider use is impeded. — The total number of factories employed in the manufacture of scientific instruments amounted to 16 in 1900, employing 146 hands, and with a value of production of 357,000 kronor.

For the manufacture of **watches** Sweden possesses the *Halda* Watch Factory, mentioned and illustrated above. In Stockholm there are the two highly esteemed Clock manufacturers *G. W. Linderoth* and *F. W. Tornberg*. Including factories for manufacturing parts of watches and clocks, Sweden has 7 watch- and clock-factories, employing 166 hands, and with a value of production amounting to 318,000 kronor. The import and export of watches and clocks, and parts of them is shown in Tables 127 and 128, pages 868 and 869. — While mentioning watch- and clock-manufacture, it may be stated in conclusion that the very highly esteemed chronometer manufacturer in London, *V. Kullberg*, is a Swede.

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11. OTHER INDUSTRIES.

Of the industries comprehended in the official factory statistics under this heading (embracing, in 1900, a total of 421 factories with 7,757 labourers and a production value of 17,900,000 kronor), the greater part is of insignificant extent. Included are, however, establishments for electric lighting as well as the graphic industry, which deserve a special treatment.

We take this opportunity to give a *general survey of the electric industry* — in our days of such an interest and of so great an importance, especially for Sweden — though in most of its parts already dealt with under different headings in the preceding.

The Electric Industry.

The electric industry has in Sweden, as in the great industrial countries, during later years undergone an immense development, inasmuch as

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the domain for the use of electric power has become continually enlarged. This is in a great measure due to our enormous supply of natural motor-power in our waterfalls and peat-mosses — both often spoken of in the foregoing (p. 772 and 848). Concerning our resources of water-power, an approximate calculation recently made by Professor Arrhenius is to be borne in mind. The natural supply of water-power in Sweden is here estimated at 4 million horse-power, and, by force of this, the reflection is made, »that probably 10 à 20 per cent of the motor-power at present requisite for the industries and rail-traffic of the whole world may be furnished from the Swedish water-falls». Even though taking into consideration that the largest portion of this abundance of power is located in such parts of the country where it cannot, at the present stage of technical development, be profitably utilized, there is, however, sufficient supply of power for the needs of the country itself for long times to come in water-falls suitably located in the Southern and Central parts of the country. A certain number of these are already put to use, chiefly for the Mining and Iron industries.

The first transmission of electric power of greater significance, was carried out in Sweden 1891/92 from Avesta, at the river Dalelfven, to the Norberg Mining field. Subsequently there have arisen in quick succession a number of such transmissions of considerable dimensions, part of which are enumerated in the subjoined Table. The system is in most cases threephased alternating current.

Mines or Works.	Distance, Kilometers.[1]	Horse-power.	Tension, Volt.	Year of concession.
Avesta—Lillefors—Norberg Mines	23	900	10,000	1893
Hellsjön (Grängesberg Mines)	14	690	9,500	1893
Enkullen (Grängesberg Mines)	12	290	9,500	1898
Lernbo (Grängesberg Mines)	27	1,500	9,500	1899
Hofors	2·4	1,990	1,500	—
Hellefors	6	1,000	2,000	—
Trångfors—Vesterås	22	1,800	14,000	1898
Skråmfors—Örebro	38	3,750	15,000	1899
Brattfors—Örebro	38	2,000	20,000	1903
Näs—Horndal	14	3,425	5,000	1897
Näs—Sandviken	54		20,000	1902
Kvarnsveden—Domnarfvet	4·5	4,800	7,000	1899
Hissmoforsen—Östersund	23	625	10,000	1894
Klabböle—Umeå	8	500	3,000	1899
Vii—Sundsvall	14·5	2,000	5,400	1899
Uddby—Stockholm	17	500	10,000	1896
Semla (Fagersta Works)	1·8	1,250	2,000	1896
Västanfors (Fagersta Works)	2·8	300	2,000	1900

The total number of transmission establishments with Royal concession amounted in October 1902 to 122, and at present (December 1903) probably has reached 150. Several large constructions have been *proposed*, e. g., from the river Dalelfven (the Elfkarleby Falls) to Stockholm (185 kilometers or 115 miles, 20,000 horse-power), and from the Trollhättan Falls to Gothenburg.

Most of the establishments above mentioned, as well as a great number of smaller dimensions furnish power for the needs of the *Mining* and *Iron industry*.

[1] A kilometer = 0·621 mile.

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At several large Iron works, such as Sandviken, Fagersta, Hofors, etc., the rolling mills are worked by electric motors (treephase system). The first rolling mill motors (à 200 horse-power) were put up in 1894/95 at Hofors; the largest motor for this purpose is to be found at Fagersta (à 600 horse-power). They are generally constructed according to a special system, Tandem-system, elaborated at the Allmänna Svenska Elektriska Aktiebolaget (General Swedish Electric Company, Ltd.) at Vesterås. This system affords a convenient use of different revolution velocities. Rolling mills with continuous current motors are set up at Nykroppa (à 400 horse-power), constructed by the Electrical Company, Ltd., »Magnet», in Ludvika. At the mines the hoisting works are run by electric power; at some places electric drilling-machines are in use. At several places enriching works for the utilization of poor ores have been established, where the enriching is carried out by means of magnetic ore-separators of Swedish construction. Electric power distribution at industrial establishments and factories is used to a large extent for running the different machines, thus substituting the old transmissions by way of straps and ropes. The Sandviken works possess one of the largest among such power-distribution establishments; 2,000 horse-power are distributed on some eighty motors. Other instances in this respect are the works of the above-said Allmänna Svenska Elektriska Aktiebolaget in Vesterås (à 450 horse-power), the State Railways Reparation works at Örebro (à 300 horse-power), the Domnarfvet Iron works, the Kvarnsveden Paper-mill, etc. Where water-power is not at disposal, the distribution is made from a steam central, as at the Aktiebolaget Separator in Stockholm, the Falun Carriage factory, the Höganäs Coal mines, a number of saw-mills in Norrland, etc.

For *Electro-chemical industries* large power-quantities are consumed, as at the Månsbo Chlorate factories, 3,750 horse-power, the Alby Carbide factory, 2,000 horse-power, and at a Trollhättan factory, 3,000 horse-power. At the Gysinge works a great quantity of the power is used for electrical steel-smelting according to the Kjellin method (»electro-steel»). Such steel-smelting is also carried on at Brattfors according to the Héroult method.

Also for the needs of *Agriculture*, as for running thrashing-machines, dairies, etc., electric power is in many places applied, especially in the Län of Örebro in Central Sweden. Electric *Railways* are principally in use only for goods-traffic of a lesser extent, being constructed according to tramway-system with continuous current of 500—600 volt (Robertsfors—Sikeå, 9 kilometers; Kvarnsveden—Borlänge, 6 kilometers; and transport tramways at a great number of saw-mills in Norrland). For passenger traffic, there is a narrow-gauge railway from Stockholm to Djursholm (12 kilometers) on the same system. The question of running the State railways as well as the larger private railways by electric power is at present under earnest consideration. The State Railway Board has started a thorough investigation on the conditions and possibilities for using electricity as motor power, water-falls and peat to be the primary powers; and the Government has, as is mentioned above, through a Water-fall Committee, caused an investigation (by Professor Arrhenius) to be made concerning the amount of water-power belonging to the State. — Electric *Tram-ways* exist in Stockholm, Gothenburg, and Helsingborg, and are in preparation in Malmö and Norrköping.

Electric light is used to a great extent, especially in towns and more densely populated localities, such as railway-station boroughs, works, and industrial centers in the rural districts. Among the 93 towns of Sweden, 53 have introduced electric light, which is furnished either from works conducted by the respective communities or concessioned companies, and there are, moreover, 9 towns which in a short time intend putting up electric centrals. The first town, not only in Sweden but also in Europe having used electricity for lighting the streets is Hernösand (1885). The largest central for electric lighting is naturally to be

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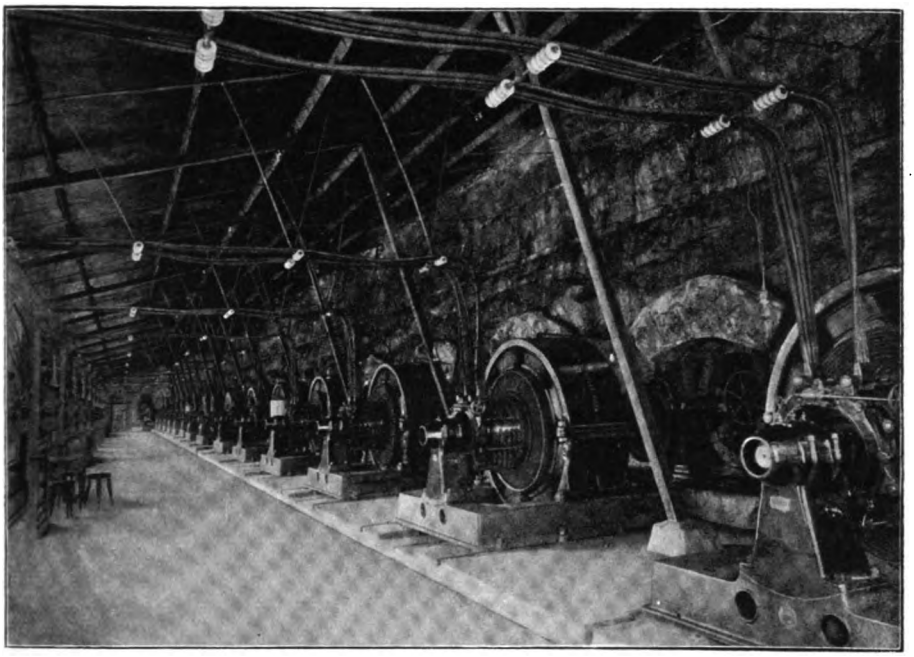

Chlorate Factory, Månsbo.

found in the Capital. In 1890/91 a steam central was built, calculated for 2,000 horse-power. Previously there were already in existence some small works and one large private one. The central furnishes the current on a three-wire system with a tension of 2 × 110 volt. The machines are assisted by large accumulator-batteries. As, however, the consumption has rapidly increased, these works have become insufficient, and during 1903 a new larger steam central has been built outside the town at the Värta harbour, and is planned for 16,000 horse-power, which by a treephased alternating current of 6,000 volt tension furnishes the electricity to four sub-stations within the town. From these a continuous current of 2 × 220 volt tension by means of asynchronous motor generators, in connection with storage batteries is distributed. The new central is for the present furnished with two machines of 2,200 horse-power each. It is planned in view of a future transmission of power from the river Dalelfven (a distance of 115 miles), upon which it is intended to remain as reserve. The older central in Stockholm is typical for the greater part of town electricity works as regards construction: steam-power, continuous current of 2 × 110 (or 2 × 220) volt, and accumulators. The centrals in Sundsvall (1891), Hernösand, Eskilstuna, Malmö, Helsingborg, Trelleborg, Oskarshamn, Karlshamn, etc., work on the same system. The motors generally are piston-rod engines, occasionally steam-turbines (de Laval system), as in Hernösand, Kristinehamn, etc. Several towns are lighted by power derived from waterfalls, as Örebro, Falun, Söderhamn, Gefle, Umeå, and in many cases the old steam centrals are enlarged and supplemented by transmission of water-power, e. g. Sundsvall, Oskarshamn, etc. The electric light is in several places generated by means of alternating current: Umeå, Hudiksvall, Motala (1890), Eksjö. In a few instances, so-called Diesel motors have been brought in use for running the generators, as in Östersund, Norrköping, Ronneby. These machines, the construction of which has been brought to a high degree of perfection by the Swedish Diesel

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Motor Works, are worked by petroleum, and are distinguished by a minimum consumption of fuel, thus being inexpensive to run.

A great number of public buildings, hospitals, etc., are furnished with their own electricity works, generally steam-engines combined with heating apparatuses. For a number of smaller establishments, petroleum and gas engines are used. The completion of two works, at present in building, viz. at Grängesberg and at Skabersjö (Skåne), is looked forward to with very great interest, inasmuch as it is intended at these places to put in use motors run by peat-gas directly produced out of peat.

Electric light is introduced into the railway-cars by some private railway companies; system: dynamos at the axles, and accumulators, or a dynamo in a special lighting car. On steamers, electric light is met with to a great extent, both in the navy and the mercantile fleet; system: continuous current mostly of a low tension (adapted for projectors); motors: swift-running piston-rod engines — a type very much in use is »Mechanicus», manufactured by the Electric Company Luth & Rosén, Ltd., in Stockholm — de Laval steam turbines or Hult rotatory engines.

The electro-technical industry in Sweden has made great progress during the last decade. At first electric machines as well as other electric articles were imported; the principal furnishers were the large world-renowned firms in Germany. Gradually, however, the home machine industry has developed to such a degree that at present it is able sucessfully to compete with foreign countries. The largest Swedish factory is the above mentioned *Allmänna Svenska Elektriska Aktiebolaget*[1] *at Vesterås*, deriving its origin from the early part of the eighties. To begin with its productions were based om important inventions by the prominent constructor Jonas Wenström, above all the so-called three-phased system. Through the patent the company gained a great advantage on other competitors in Sweden. Afterwards many important original constructions have been invented by this company, such as tandem motors, auto-synchronous motors (constructor: Ernst Danielson), electric elevators, etc. The company, which has branches in Stockholm, Gothenburg, Malmö, Gefle, Sundsvall, Kristiania, Copenbagen, Helsingfors, and London, manufactures besides electric machines also magnetic ore-separators, cranes, hoists, tramway cars, electric locomotives, arclamps, etc. A number of machines have been exported, among other countries to Russia (Ural), England, Canada, etc. It may for instance be mentioned that large alternating current machines have been delivered to the Marconi Wireless Company. From the company have been sent out 6,300 machines, representing a total of 175,000 horse-power. Among these machines the new generators for the municipal Electricity Works of Stockholm and the Brattfors generator, built for a tension of 20,000 volt direct on the armature.

Luth & Roséns Elektriska Aktiebolag[1] in Stockholm commenced its manufacture of electric machines in 1897. The firm derives its origin from the early part of the eighties. It manufactures electric machines, among others for bleaching establishments, electric locomotives and railways, steam-engines (type: »Mechanicus»), for lighting carriages for military purposes, etc., and has not inconsiderable exports to Finland. Of late, two energetic companies, the joint-stock company Magnet, Ludvika (1900), and Arbrå Mekaniska Verkstad (works; 1903), have sprung up. Some smaller factories (chiefly for the manufacture of small motors), have been in existence, but most of them have ceased their activity. Other electric material than machines is still for the greater part being imported. Arclamps are partly manufactured within the country, such as Jandus and Sirius lamps (Allmänna Svenska Elektriska Aktiebolaget at Vesterås); incandescent lamps are manufactured at »Glödlampfabriken i Nyköping». A couple of older such factories in Stockholm

[1] Aktiebolag = joint-stock Company.

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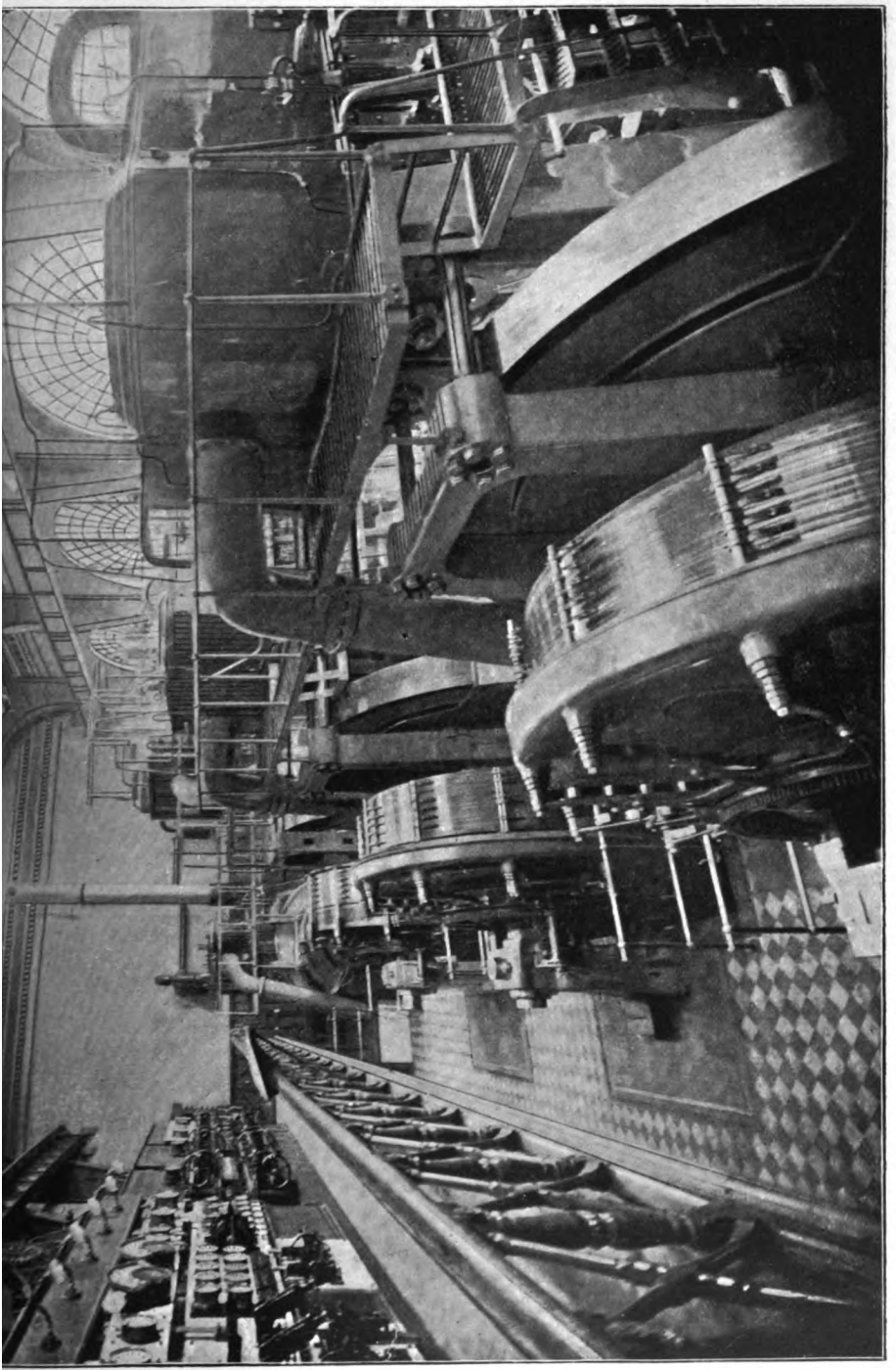

From the Stockholm Electric Central.

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have shut down. Electric wires and cables are made at the factories of Max Sievert, Sundbyberg, and at the Liljeholmen Stubinfabrik (safety-fuse factory). Porcelain isolators are made at the porcelain works of Rörstrand and Gustafsberg. Lead accumulators are not manufactured in Sweden. A new type of accumulator has here been invented by Jungner, but the manufacture has not yet commenced.

The great importance of electric power transmission and power distribution for the industrial development of the country, especially with regard to the utilization of accessible natural forces, has during the latter years necessarily attracted the attention of the law-giving authorities of the country, which have now taken measures for promoting and controlling the establishment and subsistence of electric concerns. These measures place Sweden in a very advanced position as regards legislation in this respect. **The law of June 27, 1902,** containing certain provisions with regard to electric concerns, gives instruction with regard to the form of application for concession, which, in case of certain more dangerous establishments, is granted by the Government; likewise is the right to expropriation of land for certain concerns of greater importance admitted. Moreover is responsibility stipulated in case of damages, caused by the electric currents. The control of electric establishments is exercised by especially appointed *inspectors*, subordinating under the Board of Trade. With regard to the building and management of electric establishments, there are safety provisions, given in the Royal ordinance of December 31, 1902, with a supplement of June 26, 1903.

Graphic Industries.

Printing-offices. Quite early the art of printing was introduced from Germany to Sweden, where, in 1483, a printing-office was established at Stockholm. The first book printed in Sweden — a saint's legend in Latin — was issued that same year from the said printing-house, and the first book printed in Swedish was published in 1495. In the cloister of Vadstena, founded by St. Bridget, a printing-office was put up the last mentioned year but it was burnt down the same year. During the 16th century, printeries were founded in Uppsala and Stockholm, and during the 17th century, in several other towns of Sweden. At the beginning of the 18th century, the capital of Stockholm possessed six printing-offices and Uppsala had two, but at the beginning of the 19th century, the whole country still had no more than 50. Later on, the development, however, went at a much quicker rate. In 1900, Sweden had 305 printing-houses with 1,290 printing-presses. The number of typographers amounted to 5,275, and the value of production to 11,248,000 kronor, — certainly too low an evaluation.

The increased number and working power of the printing-offices was accompanied by the introduction of *printing-machines* and then of *type-setting machines.* In 1829, the first Stop cylinder press was brought into the country, whereas the number of hand-presses by and by has gone down so as to be used only exceptionally at present. During later years the american Two revolution machines have been very estimated and are now to be found with us in a great number. That *plates*

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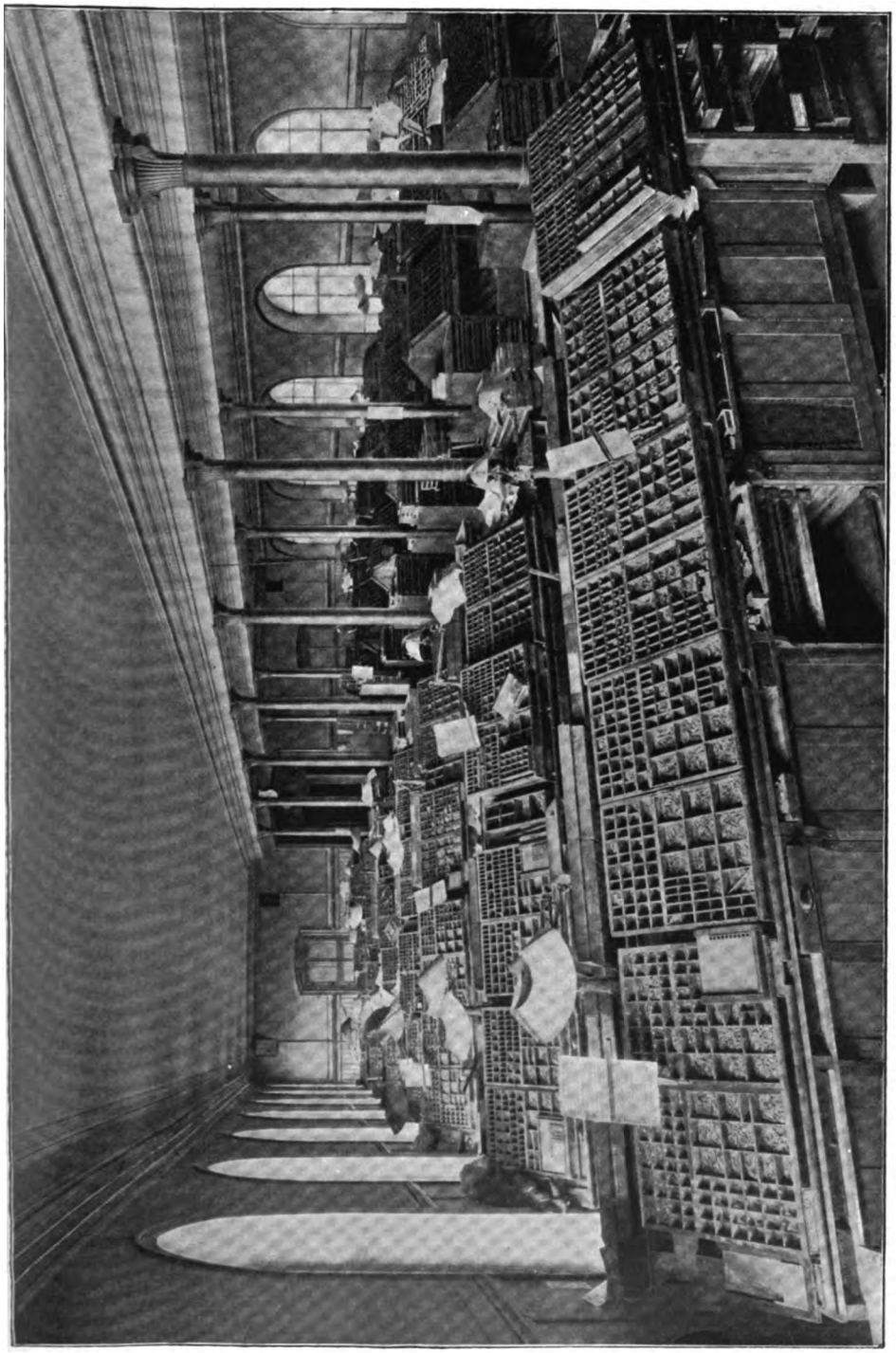

From the Government Printing-Office in Stockholm (P. A. Norstedt & Söner). Composing room.

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machines have come into extensive use and year by year increase in number need hardly be mentioned.

For the printing of newspapers ordinary *stop cylinder presses* were a long time in use; in the sixties and seventies, when the issues began to increase, they were, however, succeeded by French *double-presses* (from Marinoni or Alauzet). But the newspaper editions continued to increase, and in 1881 the first *rotary press* was introduced, which since has been followed by several, so that the number of them now amounts to 30.

The first *composing-machine*, Linotype, was imported from America. At present, 58 type-setting machines are at work, of which 26 Linotypes from America or England, 23 Typographs from Germany, and 3 Lanston monotypes from America. Both the latter kinds are used for book or newspaper composing, the others only for newspapers.

The largest printing-house of Sweden is the *Government printing-office* (Kungl. Boktryckeriet, P. A. Norstedt & Söner) of Stockholm, where this book has been printed. It is in the possession of a joint-stock company, P. A. Norstedt & Söner, which at the same time is the largest publishing-house of Sweden, for which reason the printing-office, besides official print, chiefly attends to the publications of the house itself. The firm, founded in 1823 and reorganized into a company in 1878, gives occupation to 500 workers and makes use of 26 printing-machines, of which one rotary one. Next in size comes the *Central printing-office* (Centraltryckeriet), founded in 1874. The production value amounts at the Government printing-office to about 1·3 million kronor, of which ¾ millions are working expenses, and at the Central printing-office to about 650,000 kronor. The latter occupies 42 printing-presses.

Among the Newspaper printing-offices, the size of which is chiefly dependent on that of the respective editions, the first places are due to those of the Stockholms-Tidningen and the Aftonbladet.

Of **type-foundries**, the first in Sweden was established already in 1739, but at present they are of comparatively little note. Generally they form part of the printing-offices and mostly comprise the make of stereotypes and electrotypes besides.

At the very first appearance of the *photographic* methods of reproduction their great significance was understood in Sweden, and institutions were founded for the utilization of them. To begin with, the result did not prove altogether a success, but by perseverance the work has now advanced so far that **clichés** made here must be considered of a high standard.

Lithographic institutions and phototype printeries. For the fabrication of plates, particularly for scientific purposes, lithographic institutions were founded quite early, and the number of them was steadily increasing till the end of the eighties, when the competition of the printing-offices began to make itself felt. In 1900, there existed

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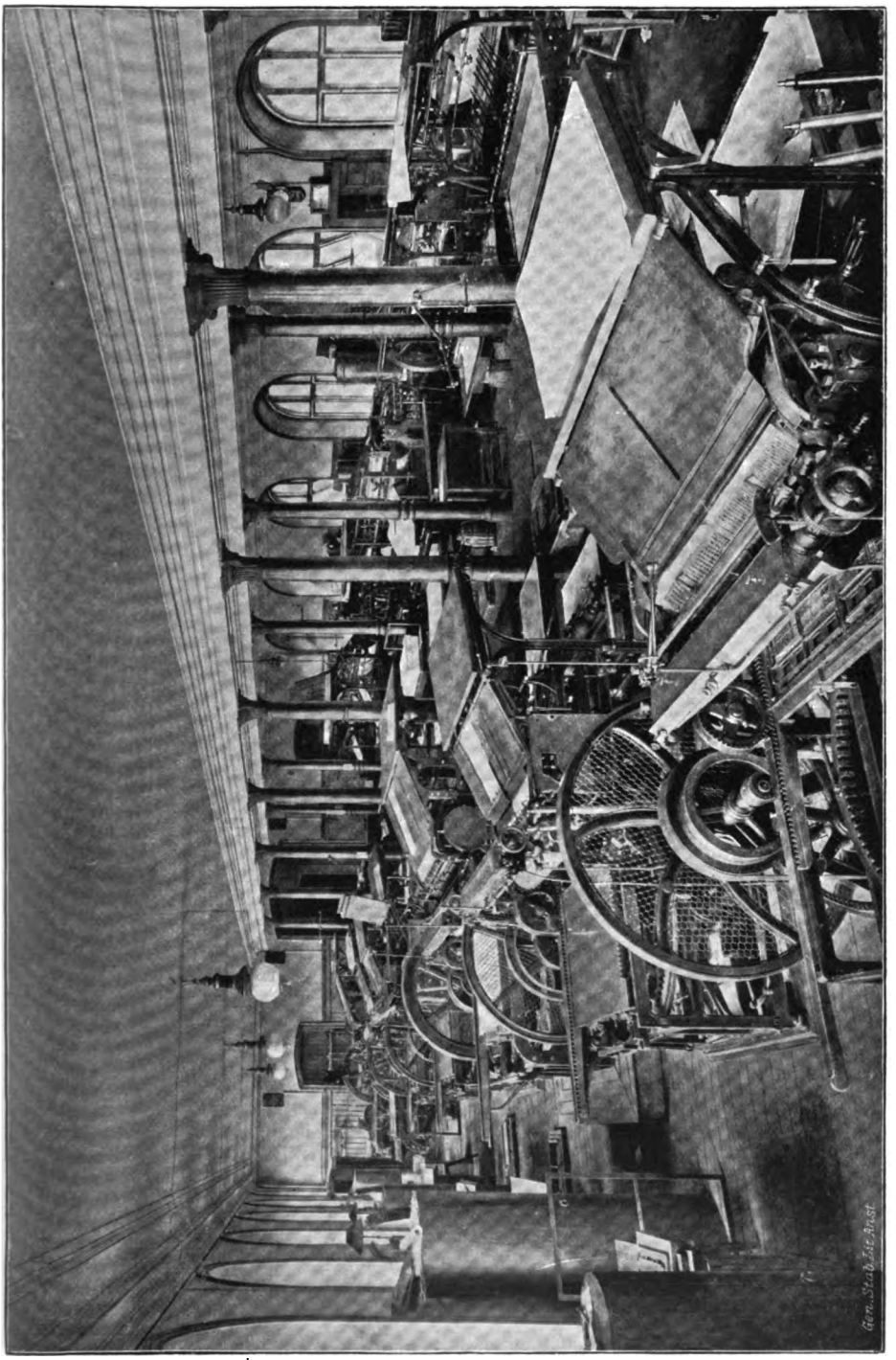

From the Government Printing-Office in Stockholm (P. A. Norstedt & Söner). Printing-room.

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in Sweden 29 Lithographic institutions with 1,544 workers and a production value of 2,414,000 kronor. The greatest was the *Lithographic joint-stock company of Norrköping* (Norrköpings Litografiska Aktiebolag), which chiefly fabricates mercantile print in large editions with a real value of about 700,000 kronor. Then come the *Lithographic printing-office of the General Staff*, which mainly makes maps, scientific plates, and photographic reproductions, especially all the official mappery of Sweden, with a production value of 270,000 kronor, and the Lithographic department of the *Central printing-office* for music, security, and mercantile print, with a production value of 250,000 kronor.

The phototype printeries, as a rule, form part of the photochemigraphic institutions and are chiefly in demand for reproduction of works of art and scientific objects as well as of photos.

12. HANDICRAFT AND DOMESTIC INDUSTRY.

The history of **handicraft** presents in our country much the same leading features as in Europe in general, especially in Germany, from which country Swedish industry is well known to have obtained its earliest impulses.

Just as elsewhere, Swedish professional handicraft leads its origin from the domestic industry of the *towns*, where a more numerous population could make a distribution of work lucrative and supply special craftsmen with a quantity of customers large enough to provide for their subsistence.

The attention devoted to the revival of the towns, at an early period caused the authorities to attempt a concentration of commerce in them as well as of handicraft; already a letter patent of 1315 by Duke Valdemar contains instructions on this point. The common law of the rural districts (of 1347), however, grants the artisans a right of carrying on their trades in these districts, and the urban law does at least not defend this either; only goldsmiths were at this time absolutely enjoined to live in town.

The first noteworthy technical progress of handicraft, as well as the juridical forms in which it up to our days has been moving: **The Guilds,** Sweden chiefly owes to *foreigners* — i. e. those German craftsmen who since the middle of the 13th century came to settle in the larger Swedish towns. Already in the town-law of the celebrated commercial city of Visby, in the island of Gotland, more than twenty different guilds are enumerated; in the remaining parts of Sweden, this institution was most probably not introduced till the beginning of the 14th century. The oldest Swedish guild document in existence is King Magnus Erikson's letter patent of 1356 to »the tailors' company» in Stockholm; the oldest guild regulations are those for the Stockholm shoemakers (before 1474). Probably the regulations for the Capital were also valid for the craftsmen of country towns.

A *native* artisan class becomes the fruit of the industrial policy of King *Gustavus Vasa* (1523/60), the principle of which was to effect a healthy disposure of work among the various head trades as well as among their branches mutually.

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For this purpose, artisans were forbidden to engage in commerce and to carry on more than one trade; likewise, merchants to drive a craft; nor yet were merchants allowed to import from abroad such manufactures by which the town artisans might be »ruined». To carry on a craft, it was necessary to be vested with the rights and privileges of the city and to be a member of a guild. The endeavours of the Middle Ages to concentrate the trades into the towns were taken up afresh and with greater earnest. The rural parts were, however, allowed to keep »tailors, shoemakers, skinners, blacksmiths, and carpenters», who were considered indispensable. Another exception was occasioned by the King's right of appointing »*freemasters*», who were permitted to carry on their trades, independent of guilds and burghership. That privilege was mostly granted to foreigners, as there was continually a complaint about the want of clever Swedish craftsmen, which still remained the case under the reign of King *Johan III* (1568/92).

The successive evolvement is marked by a still stronger patronizing of the towns at the expense of the rural districts and by more and more rigorously making the membership in the guilds obligatory. *Charles IX* (1599/1611) set down a fixed number of artisans for each hundred (härad), and as early as 1576 he ordered all the guilds of his duchy, to be close, i. e., they were to have a certain number of masters proportional to the population and size of the town. The town artisans obtained a monopoly of work inside the town and within a Swedish mile's (6⅔ English miles) circuit outside of it, but were not allowed to work beyond that district. To drive a craft it was required that the masterpiece should have gained approval by the bailiff, the council, and the alderman of the guild, which authorities, moreover, should exercise the superintendence of the guilds, examine the articles of fabric, and fix a suitable price of them. In the same spirit or a still severer one (the extension of »the mile of freedom» to two miles' distance, enhanced demands as to apprentices' and journeymen's employment, etc.), Charles as a King issued guild privileges for special crafts as well as for whole towns.

Gustavus Adolphus (1611/32) went even still farther than his predecessors in his attempts to restrict the pursuit of a craft in the rural parts. Now country artisans were not allowed to work at less than four Swedish miles' distance from a town, whereas urban ones, with the knowledge of the alderman, had permission to work for the country people. In 1644, liberty of trade in the rural districts was still more limited, so far even that all craftsmen in the country districts had to apply for the freedom of the city and to pay their taxes in town.

Had urban craft thus been almost completely delivered from the rivalry of the rural parts, it was, however, threatened with a more dangerous intrusion from another quarter. The *Nobility privileges* of 1612, as well as those of 1617, granted a nobleman the right gratuitously to keep any number of artisans he might need and to hold his domain free from all the burdens to Government and town unless the inhabitants of it carried on a craftsman's trade. In this circumstance the Nobility found a pretext for »protecting» from taxes and military conscription a quantity of »handicraftsmen» in the rural districts, who were working there for other people, as also for releasing a number of town artisans from all kinds af taxes. The attempts of checking this undue interference did not lead to any satisfactory result. — On the other hand, the new statutes of 1621 and 1622 do not know about any close guilds, though some older ones of the kind were kept up in many places, and the right of the guild alone to examine the masterpiece of an applicant, considerably checked competition.

It is also about this time that voices are heard to rise against the obligatory membership of guilds, and as a remedy against the unreasonable prices of craftsmen's goods, *Axel Oxenstierna*, Sweden's real regent during the years 1632/44, enforced the holding of markets overt, in Stockholm and Kalmar at least. But the promises

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of Government to amend the guild statutes remained unfulfilled. The only thing done during the reign of *Kristina* (1644/54) was the appointment (in 1653) of a commissioner to inquire into the reform question, to inspect all kinds of fabrics, and, in general, to exercise a superintendence on the artisans. The decree was renewed in 1662, and the activity of the »company commissioner» was now put under the control of the Board of Trade. A new general statute for the guilds was also issued in 1669. In it close guilds were expressly forbidden; any one who honestly and well had learnt his trade ought to be admitted as a master. On masterpieces and most other concerns of the guilds »the company» should not decide alone but together with the burgomaster and the council. No meetings were to be held without the permission of these authorities, and at each session one of the municipal officers, »the company councilor», should be present. In 1672, the right was granted to artisans to settle down as freemasters at Kungsholmen close to Stockholm.

The reign of *Charles XI* (1672/97), on the contrary, seems to mark a reaction as far as the guilds are concerned. During his time, close guilds were even sometimes allowed, and the prohibitions — having come out of use in the regency during the King's minority (1660/72) — against the interference of »protected men», were now re-enforced. As to the country districts Charles XI, however, maintained a more liberal opinion; to each parish was awarded the right of keeping one tailor and one shoemaker; the larger parishes were allowed to have several. Against a fixed payment to the Crown, these artisans were also relieved from all taxes hitherto accruing to the towns and from the duty of applying for burghership in them, as also from any action being brought against them by the guilds.

The decline of industry and the high prices of craftsmen's goods during the last years of *Charles XII* (1697/1718), were essentially ascribed to the guilds. One among the first measures of the new political era also was the statute of 1719 about freemasters. Every one who had learnt a trade should be allowed to drive it after giving notice to the magistracy and being vested with the rights and privileges of the city. The reform, however, was too radical to become of any duration; already the following year, the right of freemastership was by the new guild ordinance limited to immigrating foreigners. In spite of protest from the burghers, the ideas of liberty evidently flashed out again in the statute of 1724 about freemastership for natives as well as foreigners, but the reaction was soon in full sway, and in 1731 it was decreed that no home-born freemasters of such trades as stood under a guild could be admitted in the towns. In opposition to the explicit direction of the guild ordinance, the *closeness of the guilds* then followed in 1734; to the avoidance of poverty and unauthorized carrying on of the crafts, no larger number of craftmasters should be admitted than magistracy and the respective »companies» considered expedient and necessary. In 1739, the retrogressive exertions were crowned by a prohibition against the freemastership of foreigners also. With this, legislative activity concerning handicraft was for the time brought to a close; henceforth, it is the regulation of the *great industry* that attracts the principal attention.

During the just mentioned year (1739), a new *hall-statute* was issued (to replace the one of 1722) as well as new *manufacturers' privileges*. Released from the duty of belonging to any company but submitted to the Court of industry (Hallrätt) should be: all silk, woollen, and linen-manufactories together with all the works and factories belonging to them, »as well as other manufactories and artificers, of whatever denomination they may be, who choose to place themselves in subordination to the Court.» In the contests, called forth by this most undecided wording, between guildcraftsmen and manufacturers, the authorities sided with the latter, whereas the former continued to be favoured at the expense of the rural artisans. Already in 1723, the old difference between town and country trades — essentially blotted

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out by the wars — revived again; all craftsmen had to return to town, with the exception of those who for a year were in the Nobility's service or who in their capacity of parish or factory artisans, were entitled by law to live in the country districts. In 1734, the farmers indeed obtained the right of carrying on handicraft as a by-trade and of selling their own articles as well as those of others in general anywhere they pleased, but the categories of handicraftsmen proper increased but slowly.

Complaints of the exorbitant rise in guild prices, in 1762 called forth an ordinance on estimation of the goods by impartial persons, to replace the injunctions of 1720 about electing estimators from among the members of the company. The valuation should now be performed by one magistrate (not a company councilor), one merchant, one broker, and one guild artisan, who had to present their opinion before court, after which the contest should be settled summario processu.

The accession of King *Gustavus III* (1771/92) again accelerated the *reform agitation*. By the rescript of 1773 was decreed that the regulation in the guild statute of 1720 about journeymen's right to a mastership should be observed without any alteration and that thus no journeyman having served the time appointed, should be denied master and burghership. After hearing the parties concerned, the magistracy was to decide what masterpieces an applicant had to carry out and what fees had to be paid down. Married journeymen who wished to become masters were guaranteed an abridgement of their journeymanship. Also the subsequent industrial policy of the King for a long time remained decidedly liberal. Under the administration of the highly meritorious *Liljencrants* as Secretary of State, the organization of »freetowns» (begun in 1766) was enlarged; in these, »real» articles of manufacture in the iron and steel branches might be produced without any masterpiece. This liberty should now be extended to all kinds of tradesmen in the new towns thenceforth founded. All reformative plans were, however, interrupted by the resignation of Liljencrants. The King's need for the assent of the burghers to a new Constitution (1789) forced him into another course of trade policy. By a proclamation of 1789 to the burgesses of the kingdom, it was enacted that nobody should carry on a burgher's trade or business who had not been vested with the rights and privileges of the city (reserving those granted to nobility and gentry though), and that, in case a greater number of craftsmen should present themselves than might reasonably be expected to find their livelihood, due regard should be paid to the opinions pronounced on the point by the company, the elders of the town, and the magistracy. Another resolution annulled the right of admitting craftsmen conferred upon the universities (already by former constitutions) and upon public offices (since 1739) and forbade the courts of industry to bring under their control journeymen and the soldiers to keep joint workshops, whereas the latter retained their privilege of working in a guildmaster's workshop or on his account. Already in 1790, it was enacted that this liberty of work granted to the soldiers (which besides, in 1804, was extended to the country militia) should also be allotted to workmen at rifle manufactories and salt-boileries, etc., as well as »to several at the works and estates of the Crown», besides which the universities, in 1791, regained their right of appointing craftsmen; but the declaration of 1789 remained in force and rendered journeymen's right to a mastership highly difficult. On the other hand, *the freedom of handicraft in the rural districts*, in 1802 experienced an increased extension. On the presentment of the governor of a province, the State Government should henceforth in every special case be entitled to examine whether also other artisans than those already admitted by law could be appointed in future. In consequence of such special concessions, there were thus, in 1843, at various places craftsmen to be found of no less than 26 trades besides the five original ones (tailors, shoemakers, smiths, masons, and glaziers).

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After the introduction of the *new constitution* (1809), the development towards free trade found its first juridical expression of significance in the two ordinances (of 1821 and 1828) by which the old matter of dispute was settled concerning the limits between the respective territories of work for guild artisans and manufacturers. It was now stipulated that the protection of the *manufactory privileges* was to be granted by the Board of Trade: *a*) to those who duly had proved their ability of manufacturing, either such articles as were not made within the guilds or else such as were of a better quality than those generally made by the guildmasters; *b*) also to those who at a manufacturer's had got a complete knowledge of his trade and, according to the certificate of the proper magistrate or court of industry, were able to work on their own account. Such a fabricator should have the right to produce all kinds of goods within the trade of which he had obtained a privilege; besides, the same liberty of work was to be enjoyed by already appointed manufacturers and their workmen. In 1828, the clauses of the guild ordinance were declared no longer to be applicable to brewers, bakers, and butchers in the towns, and in several new towns and boroughs, the same liberty was proclaimed for handicraft in general. In 1845, the parishes obtained the right to decide what kinds of artisans ought to settle in them.

In 1846 then followed the **abolishment of the guilds.** In their places should be instituted free handicraft unions to promote the interests of the artisans. The right of practising a trade as a master was made dependent on several civic qualifications and, for most trades, on the obligation of having qualified oneself as a master; to keep a workshop in town, burghership was required besides. But any trade might be driven in the country, and the carrying on of several at the same time was also allowed. Besides, to every respectable Swedish man having attained majority the right was granted, without having acquired master — or burghership, to manufacture goods with the assistance of his wife and such children as were living at home — a right which was, moreover, extended to women. **Complete free trade** was established in 1864.

In 1900, there were in Sweden 44,517 handicraftsmen with 42,805 workmen; the masters' joint income of their trades was in the taxation-rolls entered at an amount of 26·78 million kronor. Among the employers, 1,541 were women, and among the workers, 3,950. As to the entire number of drivers of the trade — masters and workmen counted together — the following trades were the most numerous, namely: the shoemakers] with 13,708 individuals, the tailors with 12,430, the joiners with a number of 9,486, the smiths (8,794), the bakers (6,354), and the painters (5,656). The largest income assessed for employers was found among the tailors with 3·06 million kronor, builders and masons 2·91, the shoemakers with 2·84 million, etc. Though statistical information concerning handicraft in our country is to be found for several decades, it is, nevertheless, for distant times, not of sufficient exactitude to throw a clear light upon the important question about the retreat of handicraft as a result from rivalry with the great industry. It is to be supposed that the course of development has been chiefly the same in our country as on the continent of Europe.

In certain parts of Sweden, special crafts did of old attain a rather considerable development; in our days, the most important branches have, however, as a rule, passed over into great industry. For the rest,

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handicraft possessing, of course, chiefly a local importance and, at the best, finding a market at other places in the country, a more detailed account will in this connection not be necessary.

In order to effect a closer tie between the associations of craftsmen that partly had proceeded out of the old guilds, partly were voluntary ones, constituted after 1864, a **central organization of Swedish craft and industry** was formed and obtained its first common regulations in 1898. The Kingdom was divided into twenty-five districts according to Läns, being at liberty, however, to unite certain districts. In 1903, new regulations still in force were accepted. The district-division was abolished, though with the right to retain it for such places where it might be deemed suitable. The organization now became of a dual character: in the first place, there is the Central Organization of Industri and Craft for the purpose of effecting reforms in the trade legislation and generally to take care of handicraft, industry, art-industry, and even domestic industry; there is, moreover, the Employers' Central Association exclusively a contest organization, based on the special unions — each of which for its trade is endeavouring for unity throughout the whole Kingdom with a central board in Stockholm — and local unions in all working-places. These two divisions have a common office, the Central Board of Industry and Craft in Stockholm, and a common organ of their own, the Handtverks och Industri-Tidning, and are also in other respects in touch with each other. The Organization has gained great adherence all over the country; brisk activity is all the same still going on for development and perfection in this respect. — Statistics for the special artisans' unions do not exist, as far as we know; the number of general handicraft and similar unions, according to the statements of 1900, however, amounted to 76 with 5,585 members.

Domestic Industry.

Domestic Industry is of very old standing in Sweden. Going as far back as to heathen times, it is evident that already then several kinds of manual art were exercised to satisfy domestic wants. *Forging*, particularly, was such an important trade that the word came to imply manual professions in general, even in a figurative sense. Everything wanted was generally manufactured at home. Everyone had the necessary knowledge in different sorts of occupations.

During the last few decades, a decided change has occurred concerning the domestic industry **for one's own supply** so that in numerous regions it has disappeared, almost without leaving any traces behind, while, on the other hand, it has in other regions been transformed into manufacturing industry with a consequently more or less extended distribution of work.

This decline or disappearance is attributed to the development of the great industry and of commerce, to the facility — owing to improved communications — with which the products are dispersed all over the country, and, finally, to the taste for change and novelty in domestic utensils, clothes, etc., — a state of things which, in due order, has got a footing with the country people and cannot easily be satisfied by domestic industry. Among the special branches of that industry ought to be mentioned the fabrication of *textile goods* in certain Läns. Especially in the Vesterbotten Län, woman's talent for weaving is remarkable. *Domestic utensils* and *tools* are still an object for domestic manufacture in out-of-the-way localities.

The most important domestic industry by far is that of articles destined **for sale**. The fabrication of whatsoever belongs to *clothing*, and, in the first place, spinning and textile fabrics here occupy the most prominent part. This state of

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things is particularly to be met with in the Elfsborg Län. The ready-made articles of clothing manufactured in this Län, either by hand or by machine, are vests, table-cloths, and stockings. Here and there in Central Sweden, wooden shoes are made which are sold to Finland and Norway; leather shoes are more especially made in the Läns of Örebro and Norrbotten. Hair-pins, hooks and eyes are made in the Jönköping Län; straw-plaiting and straw-hats principally in the province of Nerike.

Diverse *domestic utensils* of horn and bone are manufactured in most of the Norrbotten Lappland districts; wooden articles come from certain regions of the Elfsborg Län, where tin-wares are also made. They find a market in Norrland, Finland, and Norway. Sieves and similar articles are products of the Jönköping Län, while vases and furniture are manufactured at numerous places in Central Sweden. The principal place for basket-work is our southernmost province, Skåne, from where the products go to several European States.

Of *agricultural instruments*, shovels are made in the Län of Kristianstad, scythes in that of Elfsborg, rakes, etc., in that of Norrbotten, thrashing-machines in that of Jönköping, etc.

Among raw-materials we notice: *iron wire* from the Jönköping Län, *nails* and such things from Nerike. Of *manufacturing tools*, cards are made in the Läns of Jönköping and Elfsborg, they find their market in Norrland, Finland, and Norway; reeds in Dalarne, etc. Concerning the *means of conveyance*, snow-skates, sold to Norway, are manufactured in the Vesterbotten Län, *carriages* especially in the Läns of Skaraborg and Jönköping, and, finally, *row-boats* in the Skaraborg Län.

Of late, extensive measures have been taken in Sweden to favour the development of domestic industry; these contemplate partly the direct revival of that industry, partly its utilization in the schools with a view to a sound education. It is principally the Academy of Agriculture, the County Councils, the Agricultural Societies as well as the industrial art associations that watch over the development of domestic industries. Among the industrial art associations, that of the Elfsborg Län has long occupied a prominent position. Some special schools for domestic industry have also been established.

Concerning the introduction of the industrial art as a *pedagogical subject* in the Schools, it is well known that Sweden has taken the lead. A characteristic testimony of this fact is already found in the international name in our days given to this subject, viz., **Sloyd,** — a slight transformation of the Swedish term: Slöjd. This branch of education has already above been thoroughly treated of, p. 300, where further details are to be had.

13. INDUSTRIAL ART.

The great movement born in England after the international Exhibitions in the fifties, tending to advance a closer **co-operation between art and industry,** reached Sweden only about twenty years later. But as soon as the attention had been attracted to this subject, we were seized with a vivid desire to advance and regenerate our industrial art, especially the *Textile industry*, which had once occupied a prominent place in our country. In the south of Sweden, in Skåne, it dates from medieval times. A little later, in the beginning of the 16th century, Flemish weavers settled there to make a sort of tapestry for the estates of the

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From an Exposition of the Friends of Art Needle-work.

rich country-gentlemen. Their art never became wholly extinct. Even now, some very few peasant-women, scattered about that province, know how to weave the »haute-lisse« as well as being acquainted with

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our own old national methods of weaving, the so-called »Dukagång, Krabbasnår», and others. This languishing industry was really, at the last moment, saved from absolute death thanks to the indefatigable collector of all that belongs to our ancient culture, the creator of the North Museum in Stockholm, *Artur Hazelius*, and to the many societies founded for promoting Swedish domestic art. Their work has been very successful and vastly appreciated, at home and abroad. Products of Swedish decorative art, especially of textile work and china, have won many a first prize at the great Exhibitions of the last decenniums, and are nowadays to be found in many foreign museums. The South-Kensington Museum in London, for instance, has a rather good collection of textile works from Skåne, and even such an outlying country as Chile has acquired good specimens of Swedish weaving industry.

Among the above-mentioned societies, **»Handarbetets Vänner»** (the Friends of Art Needle-work) have contributed more than any to bring about a renascence of our textile industry. This society was founded, in 1874, by Baroness *S. Adlersparre*, Mrs. *H. Winge*, and Miss *M. Rohtlieb*, together with some representative artists and expert ladies in the Capital, in order to raise Swedish domestic art and develop it on patriotic lines; to adapt for modern purposes old Swedish models and colours, being at hand in the old textile works of our peasants, in their national costumes, their lace and embroideries; to give to the finer kind of handiwork a more artistical touch; and, in general, to exert a beneficial influence upon the taste of the public.

Many af our greatest artists, as *J. Kronberg* and *Carl Larsson*, have designed the cartoons for carpets and tapestries woven by the Society. Mrs. Winge, who, with Miss *A. Branting*, directress during a period of years, have particulary devoted themselves to altar paraments, Misses *S. Gisberg*, *M. Sjöström*, *M. Adelborg*, *M. Widebeck*, *C. Wästberg*, Mrs *A. Boberg*, and the prominent decorative painter *G. G:son Wennerberg*, may also be mentioned among the excellent designers of the Society, and Mrs. *K. Nilsson* as the most skilled of their woman-weavers.

By the foundation of an Industrial School for weaving and embroidering, which has always been much frequented by all classes, the Society has made these arts quite popular.

»Handarbetets Vänner» have also given their attention to **lace-making**, a very ancient industry in Sweden. It is said to have been introduced by St. Bridget, in the 14th century, at her convent in the little town of Vadstena, at lake Vettern, where it has always been kept up. Many of our national costumes are trimmed with a kind of bobbin-work of singular originality, probably arising from some sort of hemstich. The most exquisite belong to the Leksand costume. As for that of Skåne, it may very likely have its origin in the convents, too.

Svensk Konstslöjd (Swedish Art Industry Co., Ltd.), founded in 1879 by Miss *S. Giöbel*, has partly worked on the same principles as

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»Handarbetets Vänner», but, besides that, they have devoted themselves to metal-work, furniture, wood-carving, etc., especially of chests, boxes, and the like in a national, old northern »dragon»-style with geometrical motives. In 1899, Miss *B. Hübner* and the well-known artist *A. Wallander*, noted as an eminent designer of furniture, textile patterns, tapestry-cartoons, and — above every thing — as a china-painter, became the heads of the Company. Ever since, the Company's sphere of work has been enlarged in all departments. They have adopted and very independently developed modern international ideas on decorative art. Among other talents at the Company's disposal may be mentioned Miss *F. Lönngren* and the sculptress Miss *S. Dahl*.

Wooden Stoup.

Svensk Hemslöjd (Swedish Domestic Industry Association), founded in 1899 with *Prince Eugen* at the head, have made it their object to regenerate national domestic art, to offer to the worker a brisk sale of his products, to advise him, and to accommodate him with designs. For this purpose, the Society has arranged a permanent exhibition in Stockholm for the sale of those articles. From all parts of the country, they keep products of home manufacture, very different in character and kind, e. g., textile work, furniture, lace, basket-, metal-, and pottery-work, etc.

The *Textile department of the Northern Company*, Ltd, directress Mrs *Th. Grafström*, as also the artist *J. Kulle*, *G. F. J. Karlin*, and others, have also contributed to raise our textile work.

The **manufacture of furniture** has existed for a long time in the country districts. Sometimes you meet with real masters in their trade among these country cabinet-makers. This industry is now embraced with deep interest by many of our most excellent architects and other artists, and, to all appearances, a national Swedish furniture-style seems to be developing out of the somewhat vague experimenting of the last years. Among the many designers of artistic furniture are the architect *C. Westman* and the sculptor *Chr. Eriksson*; the latter, perhaps, deserves better than any one else the title of artistic artisan. He has practised various kinds of industrial art. Whether he designs a large piece of furniture or only a simple lock, he shows the same interest, fertile invention, and sense for originality in form.

In Sweden, **china manufacture** is, at the side of textile work, the decorative art that has reached the highest degree of development. Once, we manufactured but faience from Dutch, French, and English

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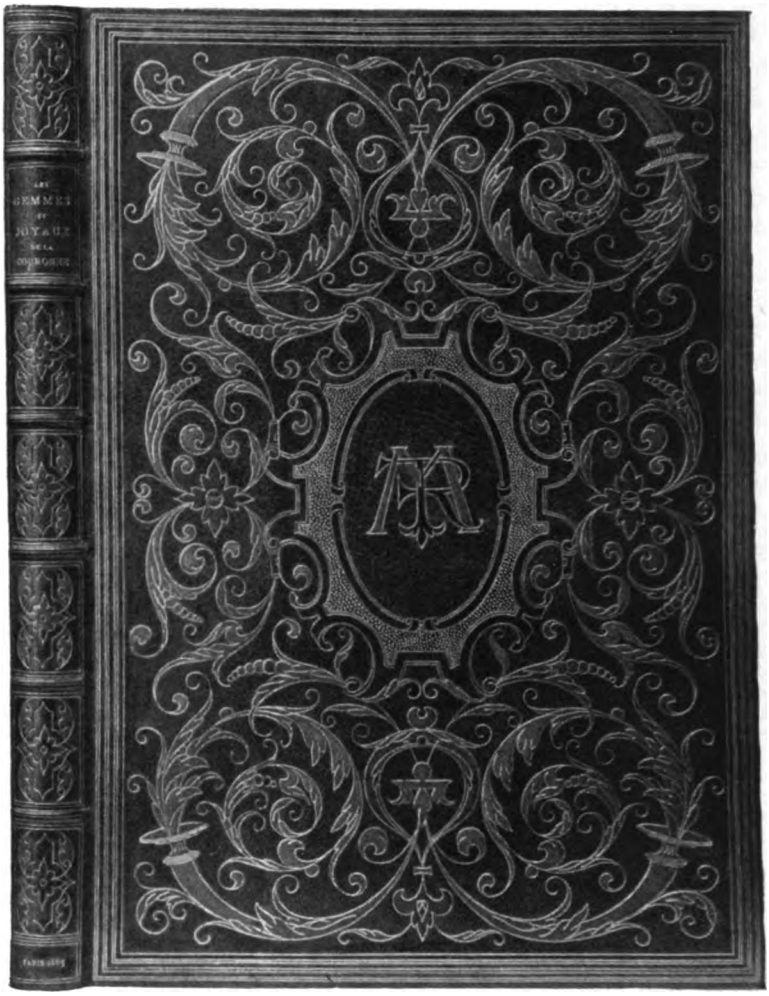

Book-cover from G. Hedberg, Stockholm.

models, but to-day, we make all sorts of ceramic work, from simple pottery up to the finest china of a wonderful beauty and sobriety of line and colour. Specially praiseworthy are the charming vases and exquisite feldspar porcelaine of Rörstrand and the objects of art of Gustafsberg, made of china with an illusory metallic lustre. By their invention of new pure and original motives, the artists A. Wallander and G. G:son Wennerberg have a great share in the quick advancement of these two manufactures. Mr. Wennerberg's talent appears also in the fine coloured glasses of Kosta. These glassworks, as well as those of Reijmyra, have gained distinction through their plates, decanters, glasses, etc., of a crystal thoroughly white, uniform, of a

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dazzling brightness, and with an extremely sharp and deep grinding. The plain **potteries** of Höganäs have arrived at such a perfection that they, too, deserve a place among works of decorative art.

The prehistoric age has bequeathed to us interesting, fine **metal-work,** but jewelry has never held a high position in Sweden. Most of our goldsmiths' works of an older date are of foreign origin. Yet, buckles and other ornaments belonging to the national costumes from the 16th and 17th centuries are very interesting and original. Pieces of coloured glass, to which the power of working miracles was attributed, are incrusted in them. The eminent development of decorative art in general has, however, also influenced jewelry, and many real artists nowadays design beautiful jewels, splendid center-pieces, cups, and other articles of luxury executed by our cleverest goldsmiths. Among these ought to be mentioned the firms of *Hallberg*, *Möllenborg* and *K. Andersson* in Stockholm.

It seems as if the working of base-metals for the purposes of industrial art ought to be a grateful task in a country so rich in minerals as Sweden, but that has not been the case in so high a degree as one might expect. Nevertheless, it is true that the Eskilstuna work is almost unsurpassed, that Messrs. *Beskow's* and *Norrström's* **steel-etchings** are of rare beauty, and that nowadays the *Förenade Konstgjuterierna* (United Artistic Foundries) in Stockholm are able to produce even the largest works of plastic art.

The **art of bookbinding** has also received new impulses and developed extremely. Also in that branch many an artist now collaborates with the artisan. The addresses, portfolios, albums, and the like of Messrs. *Beck & Son*, distinguish themselves for a great elegance and solidity, and Mr. *G. Hedberg's* book-covers are real works of art.

Svenska Slöjdföreningen (The Swedish Industrial Art Society) and many technical schools, especially the large Technical School in Stockholm, where they teach all subjects belonging to decorative art, have in their turn contributed in many respects to the exceptionally rapid progress made during the last thirty years within all departments of industrial art. And indeed, it is with the schools that the matter rests to a certain extent. In their hands lies the education of the young and the possibility of awaking the love of beauty and an artistic conception craving beauty and perfection in even the smallest homely and serviceable things.

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14. THE MOST PROMINENT SWEDISH INVENTORS IN THE DOMAIN OF INDUSTRY.

We close this chapter with an enumeration of some among the most prominent of the great number of Swedish inventors in the domain of industry, as well as of the most important among their inventions.

J. A. Brinell (born 1849). Important improvements in the technics of testing materials.

J. A. Dahlgren (1810/70). Constructor of cannons of large caliber, called »Dahlgren cannons».

C. D. Ekman (born 1845). Inventor of the sulphite method, very important in the manufacture of cellulose.

G. Ekman (1804/76). Introduced important improvements in the Swedish Iron industry.

John Ericsson (1803/89). Inventor of the propeller, of the steam fire-engine, the monitor, the warm-air machine, etc.

L. M. Ericsson (born 1846). Important improvements with regard to the telephone and its accessories.

O. Fahnehjelm (born 1846). Inventor of the magnesia-comb for incandescent light (fundamental to the modern incandescent light).

G. F. Göransson (1819/1900). Effected improvements in the Bessemer process, which first rendered the same of practical use.

C. A. Hult (born 1867) and *O. W. Hult* (born 1863). Inventors of a highly ingenious friction gearing mechanism (»centratorväxeln»), rotatory steam-engine, etc.

E. V. Jungner (born 1869). Important improvement of the electrical accumulator, etc.

A. Kjellin (born 1872). Inventor of the Kjellin method for electric steel-smelting (electro-steel).

P. Lagerhjelm (1787/1856). Constructor of a machine for testing the tensile strength of iron and steel, and thereby founder of the mechanical testing of materials.

A. Lagerman (born 1836). Important inventions in the match industry; type-setting machine (typotheter).

G. de Laval (born 1845). A great number of important inventions in the dairying industry, such as the separator, the lactocrite, the emulsor; moreover, the steam-turbine, etc.

B. Ljungström (born 1872). Inventor of the »Svea-bicycle», with changeable gearing and vertical treadling, etc.

J. E. Lundström (1815/88). Important improvements with regard to safety matches.

A. Nobel (1833/96). Inventor of the dynamite and the smoke-free gun-powder (Nobel gun-powder).

I. Nobel (1801/72). Introduced nitro-glycerine as an explosive (Nobel blasting oil); inventor of the first submarine mine.

C. R. Nyberg (born 1853). Ingenious arrangement for producing a high temperature through direct and smoke-free combustion of petroleum (soldering-lamp, etc).

A. Orling (born 1870). Inventor of the so-called Armorl-system for wireless telegraphing and telephoning; steerable torpedo, etc.

C. G. von Otter (1827/1900). Inventor of light-houses with intermittent light.

H. Palmcrantz (1842/80). Constructor of the mitrailleuse, afterwards improved by Maxim and *Nordenfeldt* (Swede).

G. E. Pasch (1788/1862). Inventor of the safety matches.

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Kr. Polhem (1661/1751). A great number of ingenious inventions with regard to the mining industry.

S. Rinman (1720/92). Several important inventions with regard to the same industry.

E. G. N. Salenius (born 1862). Inventor of the radiator.

A. Stille (1814/93). Improved surgical instruments and appliances.

R. V. Strehlenert (born 1863). Important improvements of instruments and chemical methods for the production of artificial silk.

J. G. Swartz (1819/85). Inventor of the so-called ice-method in dairying.

A. G. Theorell (1834/75). Constructor of a meteorograph, registering and printing automatically in common type the indications of the barometer, of the dry and humid thermometers, of the anemometer and the anemoscope.

A. Welin (born 1862). Inventor of an improved mechanism for breech-loading of cannons, etc.

J. Wenström (1855/93). One of the founders of the three-phase system (of great importance to the transferring of electrical power).

E. V. Westman (1823/91). Constructor of a roasting-furnace, important to the iron industry.

M. Wiberg (born 1826). Mechanism for automatically calculating and printing logarithms.

J. G. Wiborgh (1839/1903). Metallurgical inventions; moreover, Wiborgh phosphate.

J. G. V. Zander (born 1835). Founder of the medico-mechanical gymnastics, and constructor of accessory instruments and appliances.

Mausoleum of John Ericsson, at Filipstad.

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XI.

COMMERCE.

The home-trade is in Sweden pretty lively, which greatly depends on the great difference between the products of the various parts of the country. The above circumstance also can be ascribed to the fact of Sweden's communications being nowadays exceedingly good in the South of Sweden, and in the North at least considerably better than in earlier days. Great undertakings are besides continually going on for the further improvement of the communications.

The foreign trade, which we have here in the first place and principally to deal with, has in our country always had to fight against great difficulties, which are as yet far from removed. Still it ought to be stated that the knowledge of the nature of these difficulties and the endeavours to conquer them have in our days awaked to greater liveliness than has before been the case during a long time.

During the Middle Ages, the commerce of Sweden was remarkably little developed with one splendid exception, that of **Visby.** Already about the middle of the eleventh century this place commenced to be of importance as a trading town, and soon it became the center of the mercantile connection between the North, West, and East of Europe, all the way down to the Orient. This importance was made possible by the happy situation of Gotland for the communications of that time and was created through co-operation between Gotlanders and Germans, from which latter very probably came the initiative. Visby was now during centuries a rich and powerful republic, of whose importance in the shipping of that time, one can judge from the fact that the maritime law of Visby was taken for a pattern even by foreign countries. The magnificent monuments of architecture which Gotland still partly preserves, bear witness of the high culture which under the protection of wealth flourished on the island. The grand epoch of Visby was the twelfth century, but also during the thirteenth it continued to flourish. The declination is attributed to the new commercial routes that the crusades opened, further to the revival of Lübeck, and principally to Russia being shut off from European culture and commerce by the conquest of the Mongols — an event extremely disastrous for Sweden as the cultural influence

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now was cut short that during long centuries had emanated from Sweden all over the East of Europe, and the barbarism of the extreme East at once advanced to our closest proximity. Visby, moreover, in 1361 experienced the predatory expeditions of the Danish King Valdemar Atterdag, and after another century the old grandeur of the town was completely at an end.

In Sweden proper the commerce during the Middle Ages lay in the hands of the Germans. In 1251, Sweden and Lübeck made a treaty about mutual native rights and liberty of trade, by which Sweden, as the incomparably inferior party, did not profit at all but Lübeck so much the more. During nearly three centuries our foreign trade was now in the power of the **Hanseatic League**, and it was King *Gustavus Vasa* (1523/60) who broke these fetters that had prevented all possibility of higher opulence in our country.

When Gustavus Vasa took upon himself the care of the Swedish people, Swedish commerce was almost *confined to the Baltic*. Further than that scarcely a Swedish vessel sailed. The principal desire of the King was to increase the shipping, and he succeeded so far that the Swedes commenced to sail also to the Netherlands, England, and France, nay, even to Spain and Portugal — instead of fetching their commodities in Lübeck as they had done before. Besides, Gustavus Vasa tried, one might say by fair means and foul, to educate his Swedes to merchants.

King *Charles IX* (1599/1611) accomplished the division of our towns into *staple towns* and *inland towns*, of which only the former had to carry on the foreign trade. Among these Stockholm ought to be the chief port of Sweden on the Baltic and Gothenburg on the Atlantic. To his general opinion Charles IX was rather a »free-trader» — in this, as in so many other respects, before his time.

Gustavus Adolphus (1611/32) did extremely much for the improvement of Swedish commerce, and his great chancellor *Axel Oxenstierna* likewise. »The welfare of the country depends upon the commerce and shipping» was an expression often heard from Gustavus Adolphus. Agreeable to this, the towns became according to the ideas of that time objects of special care. One of the King's principles was that the country would be more benefitted by some few considerable staple-towns than by several inconsiderable ones, on account of which he reduced their number. He thus endeavoured, with the means of his time, that concentration of our commerce which still to day stands as a desideratum.

Also in other directions a rallying of energy was attempted, and it is from this time that the *company system*, so important in our days, dates its birth. In these uncertain times, poor in capital, new and large business enterprises could not be effected without support, on account of which one tried to bring them about by means of privileges and Government subventions. Thus the large **companies** often got a *monopoly* of the commerce with certain wares or with certain countries. In 1619, the *Copper company* was established, which obtained the monopoly of purchase and export of all the Swedish copper. After ten years' existence it had to be dissolved though. A new copper company was formed in 1636, but was dissolved two years later, after which the copper commerce became free. Of far greater importance was the so-called *South company*, which was privileged in 1626 on the proposition of the Dutchman W. Usselincx, with the purpose of carrying on trade in Asia, Africa, America, and Australia, and which thus monopolized all shipping with the trans-oceanic countries. Unfavourable conditions, however, prevented the company to fully realize its great schemes. Of other trading companies, we will only mention the *Tar trading companies*, which from 1648 to 1715 had exclusive right to purchase tar in Norrland and Finland to a price fixed in the license, and to export the goods.

The direct part which the State thus took in the business life is rather remote from the ideas of our time. An unmistakable cause to this existed however, namely in the fact of most of the taxes being in those days received in the shape of

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products of nature, which the public treasury itself consequently had to convert into hard cash. In this way the State had a considerable interest to see that the sale of the products of the country was effected with the largest profit possible.

Among the countries with which our foreign trade was carried on during the seventeenth century, **Holland** occupies the first place. By commercial treaties of 1614 and 1640 this country had secured greater privileges than other nations. In fact, Holland played during the latter part of the seventeenth century nearly the same disastrous role in our commerce as Lübeck during the fifteenth and the beginning of the sixteenth century. Against the wealthy and energetic Dutch merchants, ruthlessly supported even by the war fleets of the republic, the unexperienced and poor Swedish merchants were as a rule powerless. The Dutch frustrated the attempts at colonization by the Swedes both in America and in Africa, and counteracted secretly and openly the attempts of our statesmen to the improvement of Swedish commerce. The same did the Danes, who injured the commerce of Sweden, especially by the annoyances and extortions, for which the Öresund custom was used as a pretext. Through the peace of Brömsebro in 1645 Sweden succeeded in putting an end to the last mentioned inconvenience, inasmuch as the Öresund custom was abolished. (In 1720, after the disastrous wars of Charles XII, it was again introduced).

During the powerful reign of *Charles XI* (1660/97), extensive measures were taken to the benefit of commerce and shipping. With eagerness, though without any particular success, endeavours were made to draw the Dutch-Russian trade from Archangel to the ports on the Baltic, and attempts were made to lead the Persian silk trade over Russia up to Narva and Riga, — at this time Swedish possessions — which attempts, however, stranded on insurmountable obstacles.

Charles XII (1697/1718) also attached great importance to commerce, but during the constant wars all trades were ruined. During the so-called »*Era of Liberty*» (1718/72), or the predominance of the Riksdag, the Government and the Estates devoted much attention to material development. The mercantile ideas of the time were applied to the utmost. To protect home shipping, the so-called »Proclamation of products», an imitation of the English navigation act, was issued in 1724, and in it was forbidden to any foreign nation to import into Sweden anything but the products of its own country. Moreover raised customs and prohibitions of import were added.

Already during the decade 1731/40 Swedish foreign trade had risen in a considerable degree. From that time **England** appears instead of Holland as the greatest purchaser of the products of our country. Large, privileged companies still continued to be formed for more extensive and risky business enterprises. The most important of these was the *East India Company*, which lasted more than eighty years (1731/1813) and arranged a regular and profitable business connection between Sweden and the far East.

The severe pinioning and the arbitrary privileging, with which many abuses were committed, however, brought about considerable inconveniences, and after the great crisis towards the end of the decade 1761/70 more independent ideas began to prevail. Owing to the regulation of coinage of *Gustavus III* (1771/92) and the armed neutrality during the North-American war of independence, a favourable epoch for our foreign trade began, and our shipping has probably never been so profitable as during that time. Failure of crops and the Russian war of 1788/90, however, did our commerce great harm. Then, in the beginning of the reign of *Gustavus IV Adolphus* (1792/1809) favourable mercantile conditions followed, owing to the neutrality which Sweden observed during the great wars of Napoleon, but soon the country was visited with new failures of crops, commerce languished, owing to the unsafety at sea, and finally the war with

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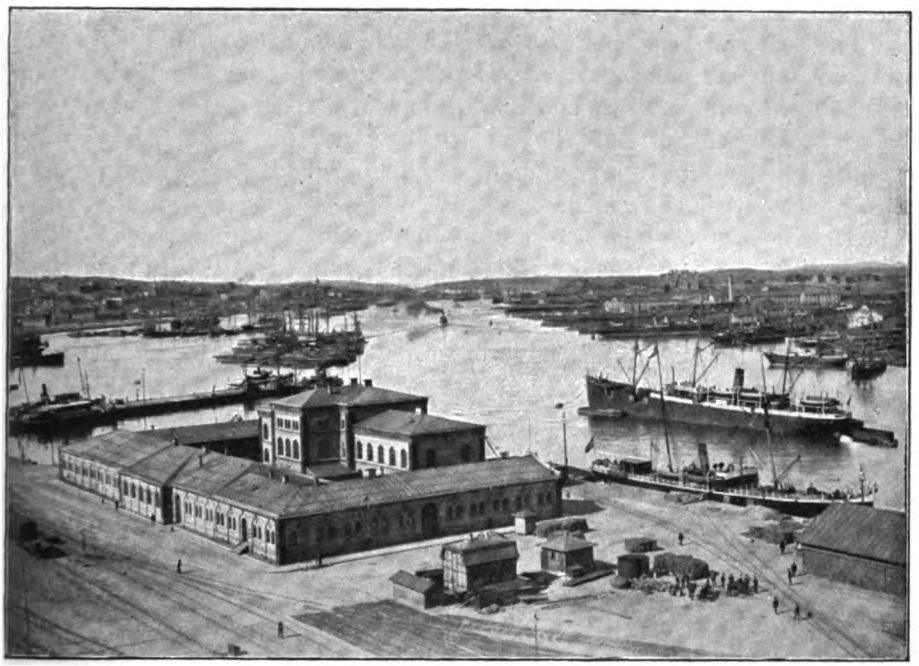
Napoleon paralyzed our foreign trade and shipping, even if the profitable clandestine trade with England (that sent its wares here to get them forwarded to the Continent) gave a temporary profit; especially Gothenburg had a short time of splendid conjunctures.



The Harbour of Gothenburg.

During the unbroken peace that Sweden has enjoyed since 1814, our foreign trade has made great progress in general extent. Already during the reign of *Charles XIV* (1818/44), it rose in a considerable degree, particularly through the regulation of the finances and the somewhat enlarged liberty of commerce and trade which slowly worked its way through. More effective still were the reforms in commercial legislation, carried out during the reign of *Oscar I* (1844/59). By means of new commercial treaties and more especially by the annulation of the Öresund custom, concerning which an agreement was made with Denmark in 1857, our foreign trade was advanced. That the progress of communications as well as the increased capacity of production and consumption also were of the greatest importance to further the cause, is a matter of course.

Through the *commercial and marine treaty with France* of 1865, Sweden accepted the free-trade system to a wider extent than before. In 1888 and 1892, a return was accomplished by the introduction of new customs and the raising of many old ones. Concerning the extent of the differences between this new customs system and the earlier one, a sort of idea can be formed by the figures which on page 930 state the proportion of the import duties to the total import value.

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Swedish trade on foreign countries is at present, in proportion to the population, quite considerable. From olden times, this trade has, however, been suffering from certain deficiences, which cannot as yet be said to have been fully remedied. Thus, for instance, the export consists chiefly of raw materials, and the import as well as the export still is carried on to a great extent by intermediate foreign hands.

The external relations also are far from being favourable to Sweden for trade on foreign countries. The Baltic has in our days become an out-of-the-way inland sea, and it were undoubtedly to greater advantage if our trade instead could be concentrated on the West coast, consequently in the large emporium of Gothenburg. But the greater part of our country is, however, bordered by the Baltic, and this sea has the traditions of centuries — not to say of thousands of years —; the possibilities of future mercantile connections on a large scale with Russia and the steadily increasing trade with Germany also speak in its favour. In addition to this, there is finally the attraction of Stockholm as a capital, and the fact that our largest exports of timber of necessity are confined to the harbours of the Bothnian Gulf. It is therefore scarcely possible to avoid continuing to have *two* commercial centers, yea, *three* — for in southern Sweden, the capital of Skåne, Malmö, is a natural center, the growth of which is, however, rendered more difficult by the competition from Copenhagen — in many cases more favoured. In this competition, the province of Skåne stands almost without support from the rest of Sweden — separated as it is from this by the great and thinly populated province of Småland. Seen at large, the economic connections between the different parts of Sweden are still very weak and leave much to be desired.

National concentration for co-operation outwards is consequently a great desideratum for our country, in the domain of trade as well as in most other domains. And although the obstacles for the realization of this are many, still the future prospects have of later times increased considerably. As regards this, it is first of all to be noted that our internal communications of late have been extraordinarly enhanced by means of our excellent railroad system. But it is also very gratifying that our people is more and more coming to acknowledge that our foreign commerce really stands in need of reforms, which can be brought about only by joint powerful exertions, and that at present earnest endeavours are made to see both where the deficiences lie and to find out the possibilities of remedying them.

Concerning the work of later times for the improvement of our foreign commerce, the **Commerce and navigation committee** ought to be mentioned foremost — demanded in 1898 by the Riksdag, by force of a private initiative, and appointed by the Government. After a detailed examination into the present state of Swedish foreign trade and shipping, at which the intimate connection between these two is strongly

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emphasized, the committee proposes sundry measures for their amendment. Several of these, principally concerning shipping, also aim at the improvement of foreign commerce, thus, for instance, the abolition or regulation of certain maritime fees, etc. But directly to the improvement of commerce, several proposals are made besides, of which a short account properly may find a place here.

Government subventions for regular steam-boat traffic were to be met with in Sweden in earlier times, and are now-a-days granted on a large scale in nearly all countries. The committee suggests the establishment of regular traffic on the following lines by means of government subventions: a) Gefle—Petersburg—Björneborg—Gefle, and b) Stockholm—Reval (and possibly)—Petersburg; besides which c) concerning the connection with *transatlantic countries* subventions are proposed for those ship-owners who possibly will open traffic on such lines, either in fixed yearly grants or else in a certain sum per ton and distance covered.

In appeals to the committee, strong claims for **bonded-warehouses** on a level with the time have been advanced from various quarters. From several of these, the attention has directed itself towards the already existing *staple-institution*, and a complaint has been heard of the restrictions in the treatment of staple goods, but also from this side, as in general, a speedy introduction of the *freeport and free-storage systems* is insisted upon, and it has been considered deplorable that our merchants in this concern lack advantages which are granted by the legislation in other countries. The question about establishing such institutions has already before been an object of investigation with a Royal Committee, that in a most convincing manner refuted objections raised, and most heartily recommended the introduction of bonding, besides which the freeport system was considered favourable for our country. A Government bill presented to that end was, however, rejected by the Riksdag of 1900. The Commerce and navigation committee — considering the free-storage system as a conditio sine qua non for carrying on trade in conformity with the time — solicits the Governement again to present a bill for bonding and to take under renewed consideration the question about measures for the introduction of the freeport system. Especially in Gothenburg, more distinct plans are for establishing a freeport.

Concerning **commercial instruction,** the Committee proposes that stipends should be granted to young men wishing to perfect their education for international trade at higher instructional establishments abroad, and that it be taken into consideration whether special instruction in the science of commerce could not be arranged at the universities of Stockholm and Gothenburg.

About **commercial stipends,** i. e., traveling studentships for young merchants and others to attain a higher standard of practical education, as also for the spreading of our articles of export abroad, the Committee proposes the subvention at present granted, to be raised from 20,000 to 40,000 kronor, and that to this grant may be added one of 15,000 kronor, which already exists for the furtherance of a market for Swedish industrial products in foreign countries. For the new amount thus arising, an alteration of provisos is demanded, among other things aiming at making the commercial stipend system more effective and, if possible, also at furthering the study of a ship-owner's business, with a special view towards forwarding the direct maritime communications of Sweden.

As to a reform of the **consular system,** a more extensive appointment of »*consules missi*» in distant countries is proposed; further the founding of new *consular studentships*, and directing the consuls to give *more frequent periodical* reports on the state of the market and the chances for a sale of Swedish pro-

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ducts; in general, the desirableness of a *livelier reciprocity* between the consuls and the home-country is emphasized.

On account of a proposition by its secretary, the Committee further proposes that under the Board of Trade a special **office of information** should be established for the collection, revision, and distribution of commercial news to the benefit of Swedish industry, trade, and shipping, and this with a special view to direct communications with the places of sale and origin. The office also should edit the consular reports, etc.

It being of great importance for the **tradesmen themselves** to get every opportunity of informing the authorities upon their views in legislative and administrative questions concerning trade, the Committee solicits the Government to elect a Board of five members, three out of whom should be engaged in trade and industry and two in naval commerce, charged partly to confer with the Board of Trade on more important questions within the range of that Board and referring to trade, partly also to partake in the management of the office of information proposed.

Most of these proposals are at present under treating of the authorities. In some cases they have already led to results.

Administrative matters concerning trade are treated by the **Board of Trade,** two of whose three bureaus transact business regarding commerce and navigation, one of them dealing with inland, the other with foreign trade. The Board subordinates under the Finance Department (up till 1900 it belonged to the Home Department).

About the chief ordinances of **legislation** concerning trade, information is given in a special article below, as also under the heading Trade Law at the end of this work. Special *courts of trade* do not exist in our country. Of the organization of **commercial instruction** an account is given below.

The **Consular system,** being still one in common for Sweden and Norway, subordinates to the Foreign Department in everything concerning the united Kingdoms in common, but under the Board of Trade in matters concerning Sweden alone. Consuls general or Consuls are appointed by the King after proposal by the Board of Trade and the Norwegian Home Department. Vice Consuls are appointed by the minister of Foreign affairs. The consuls are enjoined to watch over the interests of the united Kingdoms and to the utmost of their power try to promote their welfare, above all with regard to commerce and navigation. Some consular appointments are held by salaried magistrates sent out from their native countries (consules missi), others by merchants or others resident in the place (consules electi). These latter have generally to be elected from amongst foreigners, which does not always prove suitable (cf. the above memorial of the Commerce and navigation committee). Consules electi and, as a rule, the vice consuls outside a consul's station has hitherto been chiefly salaried by means of the so-called consulages, about which see under the heading Navigation; these fees, however, are recently abolished.

The institution of **Exchange** is little developed in Sweden. Stockholm and Gothenburg have stately Exchange-buildings, and sundry other towns possess Exchange localities. *Brokers* are engaged by the Commercial and marine commissions of the respective towns, after which their nomination is issued by the Magistracy. — The **Clearing-house** institution was not brought into our country till 1896. Most Stockholm banks have embraced the idea and lately also most of the provincial ones.

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The **General Export association of Sweden** was founded in 1887 with a view to prepare new or additional opportunities for a foreign market of Swedish products and industrial commodities. It is constituted chiefly after an Austrian model. For its ends, the association operates by giving free of charge information of price-, credit-, and freight concerns, etc.; by arranging depots and small exhibitions of Swedish products at certain important places; by distributing catalogues abroad of suitable Swedish articles of export, and so forth. The association also issues a periodical — Swedish Export —, in which at present the annual reports of the Swedish-Norwegian consuls are published, as well as other official informations concerning foreign trade and navigation. In this periodical also is published a newly elaborated *register* Concerning Swedish export: firms, adresses, specialities, etc.

Swedish **Statistics of commerce**— of old origin — is published by the Board of Trade. Formerly, these reports were rather defective, but an improvement concerning the arrangements took place in the edition of 1871, and many considerable reforms have been brought about during the nineties at the same time as the emission has got very much accelerated. Still further improvements are to be expected, first of all with regard to *valuation* of goods, which still partly leaves a great deal to be desired. On that point there has been made a proposal that the declarations of value should be returned by the importers and the exporters themselves for each special lot of goods (so-called declared values). — Besides this, the General Board of Customs publishes *monthly reports* on the imports and exports of the Kingdom of more important commodities.

The total Imports and Exports of Sweden.

The value of the commercial exchange between Sweden and foreign countries during the time since 1836 is shown by Table 129 below. During the period 1836/40, it amounted to 57 million kronor annually, but in 1902 it rose to 898 million. The immense increase is

TABLE 129. *Sweden's Imports and Exports, in 1836/1902.*

Average for the years	Mean population.	Total value, in Kronor à 1·10 shill.			Kronor per inhabitant.		
		Imports.	Exports.	Total.	Imp.	Exp.	Total
1836/40	3,083,000	27,252,000	29,888,000	**57,140,000**	8·84	9·69	**18·53**
1841/45	3,224,000	29,149,000	33,519,000	**62,668,000**	9·04	10·40	**19·44**
1846/50	3,389,000	36,399,000	39,908,000	**76,307,000**	10·74	11·77	**22·51**
1851/55	3,558,000	60,145,000	61,738,000	**121,883,000**	16·90	17·35	**34·25**
1856/60	3,727,000	80,953,000	78,983,000	**159,936,000**	21·72	21·19	**42·91**
1861/65	3,993,000	100,826,000	92,467,000	**193,293,000**	25·25	23·16	**48·41**
1866/70	4,166,000	132,626,000	126,723,000	**259,349,000**	31·84	30·42	**62·26**
1871/75	4,274,000	246,372,000	204,525,000	**450,897,000**	57·64	47·85	**105·49**
1876/80	4,500,000	268,506,000	209,857,000	**478,363,000**	59·67	46·63	**106·30**
1881/85	4,605,000	317,526,000	243,699,000	**561,225,000**	68·95	52·92	**121·87**
1886/90	4,742,000	335,527,000	272,629,000	**608,156,000**	70·76	57·49	**128·25**
1891/95	4,832,000	351,633,000	318,226,000	**669,859,000**	72·78	65·86	**138·64**
1896/00	5,032,000	452,324,000	358,581,000	**810,905,000**	89·74	71·24	**160·98**
In 1896 ...	4,941,000	358,315,000	340,283,000	**698,598,000**	72·52	68·87	**141·39**
» 1897 ...	4,986,000	408,332,000	358,195,000	**766,527,000**	81·89	71·84	**153·73**
» 1898 ...	5,036,000	455,249,000	344,909,000	**800,158,000**	90·39	68·49	**158·88**
» 1899 ...	5,080,000	504,789,000	358,185,000	**862,974,000**	99·36	70·51	**169·87**
» 1900 ...	5,117,000	534,935,000	391,334,000	**926,269,000**	104·54	76·48	**181·02**
» 1901 ...	5,156,000	466,320,000	353,505,000	**819,825,000**	90·45	68·56	**159·01**
» 1902 ...	5,187,000	505,196,000	392,373,000	**897,569,000**	97·40	75·64	**173·04**

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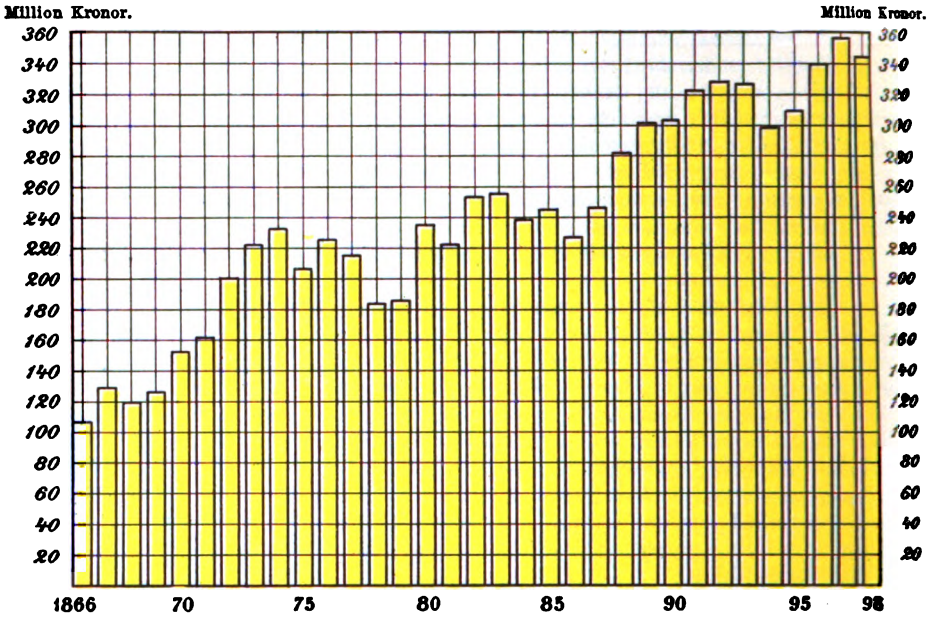
The value of Exports from Sweden, in 1866/1898. [1]



partly explained by the fact that, half a century ago, our country still lay, as it were, outside the system of international communication. Between 1850 and 1870, there was a transition in this respect to the modern state of things. There is an enormous stride between the two periods 1866/70 and 1871/75; during the former, our commercial exchange amounted to 259 million kronor annually, during the latter to 451 million kronor, or nearly 75 % more.

As in the majority of European countries in our time, thus in Sweden too, the commercial statistics show a growing inferiority in the money-value of the exports in relation to that of the imports. It is, however, hardly necessary to enter into the details of the general principles explaining this circumstance, and showing that the difference is, at least in part, only seeming. As to the very strong growth of *imports* in our country, during the last few years, it is partly explained by increased consumption, but still more by an increased demand for raw materials and machinery for the very flourishing manufacturing industry. From this point of view, the increase of imports is naturally a very happy circumstance, provided, however, that the exports of the immediate future bear testimony of a consequent increase also in the exporting ability of our industries.

That the *exports* have hitherto, during latter years, shown a comparatively smaller increase is partly explained by the fact of corrections

[1] In each of the years 1899—1902 the Export values amounted to respectively 358, 391, 354, and 392 million kronor, see Table 129, p. 917.

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TABLE 130. *Imports and Exports at the principal ports, in 1902.*

Ports.	Total value, in Kronor.			In % of the total imports and exports of the Kingdom.		
	Imports.	Exports.	Total.	Imports.	Exports.	Total.
Stockholm	143,306,000	36,521,000	179,827,000	28·37	9·31	20·03
Gothenburg	123,982,000	95,906,000	219,888,000	24·54	24·44	24·50
Malmö	56,911,000	30,441,000	87,352,000	11·27	7·76	9·73
Other ports	180,997,000	229,505,000	410,502,000	35·82	58·49	45·74
Total	505,196,000	392,373,000	897,569,000	100	100	100

having been made in the commercial statistics, which formerly for long periods of time have given too high unit-values to several of our more important export articles. In this way we can explain, for instance, the decrease which certain of the later years show in the diagram on page 918.

Compared with other countries in our part of the world, the exports of Sweden in our days are very considerable. Per inhabitant it amounted in 1896/1900, on an average to 71 kronor a year. The corresponding average for Europe amounts to about 60 kronor. For the German Empire, it amounts to 70 kronor, for France to more than 90, for Great Britain and Ireland to more than 140 kronor. Thus Sweden stands in this case fully on a level with Germany.

The largest **commercial cities** of Sweden are Gothenburg, Stockholm, and Malmö. The commercial exchange of each of these cities with foreign countries in 1902 is shown by Table 130 above. Of the entire imports of Sweden, no less than 64 % belong to these three ports, but of the exports only 42 %. The latter circumstance is due to the fact that our greatest export article (timber) is principally shipped from the Norrland ports (especially Sundsvall, Hernösand, Gefle, and Söderhamn), which, on the other hand, only in a small degree exchange other articles with foreign countries.

Imports and Exports of different kinds of Goods.

Detailed statements in regard to the imports and exports of a great number of goods have already been given in the preceding pages in the treatment of the separate branches of industry of our country. What we still have to give is essentially a review of the situation of larger groups of goods. The most general data in this matter are given in Table 131, p. 920 and Table 132, p. 923.

A) We will first take into consideration the groups in which **imports** are predominant.

Since about 1880, this has been the case with the group of **cereals**, which during the immediately preceding forty years showed an export surplus. For nearer details in this respect, we refer to the agricultural section of this work, pages 525, 532, etc.

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TABLE 131. *Imports and exports of Sweden. Groups of merchandise.*
Value in thousands of Kronor à 1·10 shilling or 0·268 dollar.

Groups of merchandise.		Average 1871/75.	Average 1876/80.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1902.
Live animals	Imp.	610	939	1,421	1,169	795	1,126	1,088
	Exp.	6,867	6,432	8,752	8,815	5,059	3,046	2,253
Animal food	Imp.	17,263	22,948	20,380	16,168	15,993	21,427	27,424
	Exp.	6,929	9,530	18,677	40,302	59,252	49,238	45,595
Cereals	Imp.	19,613	32,645	42,056	29,868	34,311	39,798	63,891
	Exp.	36,830	39,316	29,126	18,577	15,228	4,124	2,243
Colonial products	Imp.	37,101	44,076	40,604	50,115	47,688	40,952	34,088
	Exp.	72	97	177	691	1,136	301	669
Fruits and Garden products	Imp.	3,574	3,456	4,366	4,173	4,985	9,273	13,459
	Exp.	163	176	248	627	543	1,148	1,639
Spirituous and other liquors	Imp.	7,376	5,483	8,744	7,978	7,086	7,800	8,284
	Exp.	329	967	2,026	2,810	660	226	447
Raw textile material	Imp.	20,558	16,842	20,433	23,864	20,592	24,666	30,700
	Exp.	307	294	394	366	122	176	222
Yarn and thread, etc.	Imp.	8,635	8,202	9,375	10,356	11,937	17,419	14,552
	Exp.	178	286	506	1,043	1,052	1,080	1,254
Textiles	Imp.	37,574	38,427	51,394	55,520	48,415	44,505	37,398
	Exp.	2,009	2,766	4,182	5,594	7,879	4,461	2,047
Hair, hides, bone, horn, and other animal matters	Imp.	14,090	14,326	15,643	17,386	18,421	23,201	24,128
	Exp.	1,210	1,112	1,556	1,903	2,945	4,557	6,155
Manufactures of d:o	Imp.	880	1,425	2,484	3,412	3,023	2,917	2,451
	Exp.	211	68	100	342	656	545	340
Oils, tallow, tar, rubber, etc.	Imp.	8,082	10,181	13,042	14,086	17,004	25,143	34,665
	Exp.	1,203	1,224	1,678	1,483	1,630	1,274	1,788
Manufactures of d:o	Imp.	890	1,723	2,060	2,250	2,481	3,039	3,328
	Exp.	133	243	400	797	836	1,028	1,815
Timber, unwrought, sawn or cut	Imp.	888	887	1,696	1,970	2,315	3,962	2,635
	Exp.	84,739	88,308	96,506	98,519	113,098	144,356	148,587
Timber, wrought	Imp.	848	1,085	1,639	1,767	2,238	1,479	1,339
	Eyp.	6,439	10,596	13,460	18,257	23,621	35,123	45,105
Colours, paints, and dyeing-materials	Imp.	2,320	2,046	2,605	3,409	4,376	5,751	6,449
	Exp.	169	212	343	374	322	294	226
Diverse vegetable matters	Imp.	5,089	6,319	8,777	8,737	10,418	12,758	20,580
	Exp.	650	726	896	677	596	461	640
Paper, and manufactures of *	Imp.	1,900	2,338	3,421	4,526	4,900	4,437	4,267
	Exp.	2,464	5,401	9,285	16,656	20,108	10,682	19,194
Other manufactures from vegetable matters	Imp.	151	161	323	493	827	1,990	3,679
	Exp.	19	23	41	171	415	426	673
Minerals	Imp.	18,756	18,354	23,895	31,598	40,625	69,195	78,138
	Exp.	1,077	1,413	1,747	4,196	9,131	18,543	23,204
Minerals, manufactures of	Imp.	1,820	2,564	3,147	3,509	3,615	5,239	5,389
	Exp.	545	1,317	3,164	5,043	9,611	13,032	15,360
Metals, unmanufact. or partly manuf.	Imp.	9,542	9,306	8,614	9,300	9,003	17,931	21,945
	Exp.	46,409	34,513	40,645	34,523	30,995	40,459	41,370

* The decrease in the exports for the years 1896/1900 is altogether due to corrections made in the calculation of the value, see pp. 918 and 919.

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TABLE 131 (Continued). *Imports and exports.* Thousands of Kronor.

Groups of merchandise.		Averages 1871/75.	Averages 1876/80.	Averages 1881/85.	Averages 1886/90.	Averages 1891/95.	Averages 1896/00.	In 1902.
Metals, manufactures of	Imp.	9,526	7,849	12,251	14,076	17,843	25,868	28,748
	Exp.	1,537	1,390	4,336	4,249	4,979	9,077	11,685
Vessels, carriages, machinery, instruments, etc.	Imp.	14,061	10,038	12,514	15,145	17,494	35,208	29,319
	Exp.	1,182	1,524	2,773	3,619	5,394	11,554	16,804
Coin	Imp.	3,850	4,973	3,724	1,429	878	635	288
	Exp.	2.315	1,000	337	135	82	1	—
Other articles	Imp.	1,375	1,913	2,918	3,223	4,370	6,605	7,924
	Exp.	539	923	2,344	2,860	2,876	3,369	3,068
Total	**Imports**	**246,372**	**268,506**	**317,526**	**335,527**	**351,633**	**452,324**	**505,196**
	Exports	**204,525**	**209,857**	**243,699**	**272,629**	**318,226**	**358,581**	**392,373**

A class of goods which must always show an import surplus are **colonial products,** of which we import for 40 to 50 million kronor annually, while the export is not worth mentioning. The greatest article in this group is *coffee* (18 million kronor in 1902), which, next to coal, is our greatest import article, on the whole. Next to coffee comes *tobacco* (about 8·2 million kronor). On the other hand, sugar, which was formerly imported annually in tens of million kronor, is now manufactured in Sweden itself in sufficient quantities — surely one of the most remarkable reforms in Sweden's economical life in later times.

The import of **fruits and garden products** is also decidedly greater than the export. The most important articles in this group are hops, as well as raisins, plums (prunes), almonds, oranges, etc. On the other side, the export of *forest berries* is beginning to develop, especially of red whortleberries, more than for one million kronor being exported annually.

Liquors for about 8 million kronor are imported annually, principally *wine* (4 1/4 mill. kronor) and *cognac* (1 3/4 mill. kronor). In the decennium 1881/90 a brisk business was carried on by a firm in Karlshamn by importing raw spirits from Russia, which were refined in Sweden and then exported, principally to Spain, but this business was ruined by raised import-duties in this latter country. (See p. 786).

In 1902, **textile material** for 31 million kronor was imported into Sweden, but the export was almost nil. The largest amount was cotton (13·17 million kronor), wool (10·72 million kronor), raw-silk, jute, hemp and flax, etc.

The import of **yarn and thread,** etc., amounted the same year to nearly 15 million kronor; the largest items were woolen yarn (8·94 million kronor) and cotton yarn (2·03 million kronor). The export was insignificant.

The group of **textiles** belongs to the very greatest items in the annual purchase-demands of our country. In 1902, the total value of

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this import amounted to 37 million kronor, but has earlier been about ten or twenty million kronor higher. Thus our home factories have increased their capacity to manufacture for the needs of the country. At one time, there was a rather considerable export of textiles to Norway, which has in some degree decreased on account of the abolishment, in 1897, of the Swedish-Norwegian Commerce Treaty (see p. 190). — Of the import of 1902, about 4·51 million kronor was pure- and cotton-silk fabrics, 11·69 million woolen fabrics, 6·21 million cotton fabrics, 2·26 million linen, hemp, and jute fabrics, and 12·73 diverse goods.

In 1902, **hides and furs** to a value of more than 16·61 million kronor were imported, and for about 1 1/2 million kronor of other animal substances (not eatables), besides 6·82 million kronor of fertilizers. Unprepared hides to a value of 4·67 million kronor were exported; while the export of other goods of this class was slight. The import of **articles manufactured from hides,** furs, hair, bone, horn, etc., amounted to 2·45 million kronor, but the export was insignificant.

Oils, tallow, rubber, and similar substances are collected in our statistics in one group, the total import of which amounts to nearly 35 million kronor, 10·58 million of which are for kerosine and petroleum, for other oils 10·26 million, and for other articles of this class 13·83 million kronor. The export was slight; only that of tar rising to 0·66 million kronor. The import of **manufactured articles** of the aforesaid kind amounted to over 3 million kronor, and the export to somewhat more than half that sum.

Colours and paints amount to 6 1/2 million kronor in import, while the export is hardly worth mentioning. The same is the case with diverse substances from the **vegetable kingdom** (cork, seeds, etc.), the import of which amounts to as much as 20 or 21 million kronor, while the export is only 2/3 million. For about 3 2/3 million kronor of **articles manufactured** from such substances were imported, while the export amounted only to 2/3 million.

Of **minerals** Sweden now exports considerable quantities, but the import is, nevertheless, by far predominant, since it includes our greatest import-article, *coal*, which annually costs our country a sum of 60 million kronor in purchase-money. (Concerning the possibility of making savings in this respect by our peat-mosses, see p. 848). Large quantities of *salt* are also imported, which necessary our country entirely lacks. Altogether the import within this group embraced in 1902 a value of 78 million kronor, while the export stopped at 23 million. The export embraced principally unwrought *stone* (2·21 million kronor), cement (0·51 million kronor), and especially *iron ore* (14·01 million kronor), as well as *zinc* and other ores (together nearly 2 million kronor). It is to be noted that the exports of iron ore surely will increase considerably in the immediate future, owing to the recent opening of the great railway line from the Kirunavara ore-field to the Atlantic.

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TABLE 132. *Imports and exports according to purposes or origin.*[1]

Value in thousands of Kronor à 1·10 shilling or 0·268 dollar.

Kinds of merchandise.	Average 1871/75	Average 1876/80.	Average 1881/85.	Average 1886/90.	Average 1891/95.	Average 1896/00.	In 1902.
Imports.							
Food and drinkables	85,391	108,850	116,419	108,594	109,755	112,976	131,168
Textiles, yarn, thread	38,021	39,504	54,167	59,602	54,093	50,006	44,251
Household articles	17,882	21,857	31,319	37,075	39,513	53,735	52,265
Raw materials	80,531	78,885	94,814	109,471	120,670	188,178	228,784
Machinery	20,697	14,437	17,083	19,356	26,724	46,794	48,440
Coin	3,850	4,973	3,724	1,429	878	635	288
Total	**246,372**	**268,506**	**317,526**	**335,527**	**351,633**	**452,324**	**505,196**
Exports.							
Agricultural products[2]	52,311	56,913	58,688	70,563	83,107	62,280	58,584
Timber, and manuf. of	92,255	99,679	110,930	116,384	137,242	180,138	194,510
Textiles	2,332	3,177	4,816	6,596	8,617	5,511	3,336
Paper[3]	2,715	5,864	9,925	17,113	20,803	11,609	20,255
Minerals	2,178	3,620	5,740	9,251	18,728	31,537	38,493
Metals	48,520	36,398	46,635	41,499	40,276	60,361	68,986
Other merchandise	1,899	3,206	6,628	11,088	9,371	7,144	8,209
Coin	2,315	1,000	337	135	82	1	—
Total	**204,525**	**209,857**	**243,699**	**272,629**	**318,226**	**358,581**	**392,373**

Sweden has also a very great import and export of **metal work**, but with a considerable surplus of the former. The greatest article of import in this class is *rails* (5·9 million kronor in 1902), the greatest export articles, however, are pipes and pipe-parts of iron and steel, etc. The group **machinery and tools** (including vessels) has a certain connection to this group, with great and growing import and export, the former amounting in 1902 to upwards of 30 and the latter to nearly 17 million kronor. Among imported articles of this group, we notice vessels (4·02 million kronor); the export of this group embraces a large number of different articles, only one of which, however, amounts to a considerable total, i. e., the *separators*, of which we exported during the year to a value of 7·28 million kronor.

Of the articles **not classifiable** under the aforesaid groups, and forming a final group in our commercial statistics, the import is always somewhat higher, too, than the export (in 1902 respectively 7·92 and 3·07 million kronor).

Out of the 25 groups, into which our import and export trade is divided in Table 131 (coin excluded) we have now treated of 18. The total import of these groups amounted in 1902 to 442 million kronor, while the export did not amount to more than 75 million. Now we will proceed to:

[1] According to the official statistics. The classification is here somewhat different from that otherwise used in this work. — [2] Including fishery products. — [3] See the note p. 920.

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B) The groups within which the **export** is decidedly predominant. To these groups properly belong the products of forestry, of cattle-breeding, of paper industry, and of mining and metal manufacture.

The greatest of all our export articles is **unwrought timber,** which certain years amounts to equally large values as the whole of our other export put together. In 1902, the export of unwrought (sawn, hewn, and cut) timber amounted to nearly 149 million kronor and the import not quite to 3 million. Also our export of **wrought timber** is considerable and rapidly growing. In 1902, it amounted to over 45 million kronor, 26·48 million of which represented wood-pulp, 7·78 million kronor was for matches and 10·19 million for joinery and carpentry works. — One of our greatest export articles is also **paper**, whereof there was exported, in 1902, for 19 million kronor; the imports amounted only to about 4 million.

In 1902, Sweden imported nearly for 28 ½ million kronor of **live animals** and **animal food,** but exported for nearly 48 million kronor. The import articles are principally *pork* and *salted herrings*, the export-articles *butter*, *pork*, and *unsalted herrings*. The export of butter has of late years amounted to about 40 million kronor annually.

Our export of unmanufactured minerals and of metal goods is very considerable, but is excelled by the import, wherefore these articles are treated of above. We export considerably more of **manufactured minerals** and of **unmanufactured metals,** however, than we import. Of *iron* and *steel* (unwrought or only partially wrought) we exported in 1902 for more than 39 million kronor, these goods thus forming one of the standard articles of our export. On account of sinking prices in the world's market, the export of iron and steel has not, however, since reached the high values which it attained during the first half of the decennium 1871/80.

The total import of the seven groups now treated amounted in 1902 to about 63 million kronor, but the export to 317 million.

A summary of our *import*, according to the use of the articles, and of our *export*, according to the main industries from which the different articles are derived, is given in Table 132, p. 923.

Sweden's commerce with different countries.

The countries with which Sweden has the greatest intercommerce are Great Britain and Ireland, the German Empire, Denmark, Norway, Russia and Finland, and also France, the Netherlands and Belgium — thus in the first place our neighbouring countries. With regard to this ought, however, not to be forgotten, the weakness noticeable in the commercial statistics of our country as well as of most other countries, in entering as place of origin that port whence the goods were last shipped, and as country of destination that to which goods were first shipped — in consequence of which the adjacent countries are always

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TABLE 133. *Sweden's imports and exports from and to different countries.*

Average for the years	Thousands of Kronor[1]		Percentage of the whole[2]			Thousands of Kronor[1]		Percentage of the whole[2]		
	Imp.	Exp.	Imp.	Exp.	Total.	Imp.	Exp.	Imp.	Exp.	Total.
	United Kingdom.					*Netherlands.*				
1861/65	24,209	44,697	24·01	48·34	35·65	3,928	3,060	3·89	3·30	3·62
1866/70	29,631	64,011	22·84	50·51	36·11	5,677	4,698	4·28	3·70	4·00
1871/75	81,362	108,228	33·03	52·91	42·05	9,237	5,634	3·75	2·75	3·29
1876/80	77,223	109,084	28·76	51·98	38·95	10,249	7,842	3·81	3·73	3·78
1881/85	82,333	119,468	25·93	49·02	35·96	7,894	9,163	2·48	3·75	3·03
1886/90	92,875	126,029	27·68	46·23	36·00	7,427	12,243	2·21	4·49	3·23
1891/95	95,152	140,485	27·06	44·15	35·18	8,343	16,634	2·37	5·23	3·73
1896/00	138,072	153,828	30·53	42·90	36·00	9,813	25,105	2·17	7·00	4·31
In 1902	130,070	149,927	25·75	38·21	31·19	13,407	24,068	2·65	6·13	4·18
	German Empire.					*Belgium.*				
1861/65	33,888	7,699	33·61	8·33	21·52	1,088	2,084	1·07	2·25	1·64
1866/70	34,170	11,150	25·76	8·80	17·47	1,162	3,123	0·88	2·46	1·65
1871/75	55,565	14,333	22·55	7·01	15·50	5,943	8,943	2·41	4·37	3·30
1876/80	59,075	14,411	22·00	6·87	15·36	8,068	9,691	3·00	4·61	3·71
1881/85	88,239	18,958	27·79	7·78	19·10	9,139	8,906	2·87	3·65	3·21
1886/90	101,803	29,026	30·34	10·65	21·51	10,236	9,572	3·05	3·51	3·25
1891/95	116,913	42,498	33·25	13·36	23·80	10,356	10,724	2·95	3·37	3·15
1896/00	156,538	51,872	34·61	14·47	25·70	14,161	13,457	3·13	3·75	3·41
In 1902	196,971	62,781	38·99	16·00	28·94	17,844	15,625	3·53	3·98	3·73
	Denmark.					*Russia.*				
1861/65	8,846	7,889	8·77	8·53	8·66	4,112	224	4·08	0·24	2·24
1866/70	26,519	8,509	20·00	6·71	13·51	10,243	1,375	7·72	1·09	4·47
1871/75	39,193	22,371	15·91	10·94	13·65	14,666	2,825	5·95	1·38	3·88
1876/80	49,184	22,267	18·31	10·61	14·94	20,665	1,645	7·70	0·78	4·66
1881/85	52,862	28,610	16·65	11·74	14·52	23,373	2,597	7·36	1·07	4·63
1886/90	44,350	32,006	13·22	11·74	12·56	21,344	3,293	6·36	1·20	4·05
1891/95	41,375	38,829	11·77	12·20	11·97	14,875	4,341	4·23	1·86	2·87
1896/00	55,455	43,987	12·26	12·27	12·26	20,640	5,100	4·56	1·42	3·17
In 1902	63,212	55,265	12·51	14·09	13·20	23,940	4,472	4·74	1·14	3·17
	Norway.[3]					*Finland.*				
1861/65	5,526	2,677	5·48	2·89	4·24	2,869	1,904	2·85	2·06	2·47
1866/70	7,446	4,992	5·62	3·94	4·80	3,157	1,662	2·38	1·31	1·86
1871/75	12,939	7,139	5·25	3·49	4·45	4,938	3,346	2·00	1·64	1·84
1876/80	14,213	7,029	5·29	3·85	4·44	6,743	3,433	2·51	1·64	2·13
1881/85	20,489	9,841	6·46	4·04	5·40	7,237	5,100	2·28	2·09	2·20
1886/90	28,283	14,376	8·43	5·27	7·01	6,649	5,360	1·98	1·97	1·98
1891/95	31,203	17,018	8·87	5·85	7·20	5,037	6,121	1·43	1·92	1·66
1896/00	25,037	11,875	5·54	3·31	4·55	7,433	9,977	1·64	2·78	2·14
In 1902	24,327	24,336	4·82	6·20	5·42	6,378	8,997	1·26	2·29	1·71
	France.					*Other countries.*				
1861/65	2,379	10,080	2·86	10·90	6·44	13,981	12,153	13·88	13·16	13·52
1866/70	3,855	16,193	2·91	12·78	7·73	10,766	11,010	8·11	8·70	8·40
1871/75	8,058	19,049	3·27	9·31	6·01	14,471	12,657	5·88	6·20	6·03
1876/80	8,168	26,562	3·04	12·65	7·26	14,918	7,893	5·58	3·78	4·77
1881/85	7,945	29,373	2·50	12·05	6·65	18,015	11,683	5·68	4·81	5·30
1886/90	7,059	25,188	2·10	9·24	5·30	15,501	15,536	4·63	5·70	5·11
1891/95	8,265	28,111	2·35	8·83	5·43	20,114	13,465	5·72	4·23	5·01
1896/00	8,300	29,544	1·83	8·24	4·67	16,875	13,836	3·73	3·86	3·79
In 1902	9,310	27,679	1·84	7·06	4·12	19,737	19,223	3·91	4·90	4·34

[1] A krona = 1·10 shilling or 0·268 dollar. — [2] That is, the imports and the exports from and to each country in per cent of the whole imports and exports of Sweden. — [3] The figures for the *exports* from Sweden to Norway are very incomplete for the years 1897/1901 and incomplete also for the years 1861/96, hence, complete only in 1902.

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estimated to high, at the expense of the more distant ones. This is even to an unusually high degree the case as regards Swedish commerce, in which England and the German Empire, and partly also Denmark, still serve as intermediaries for the commerce with more remote places.

A survey of our commerce with other countries since 1861 is given in Table 133 (p. 925). As will be apparent at once, **Great Britain and Ireland** have been of the greatest importance to us in this respect during the whole period. For some time, even more than half of our total exports went to this country; during the last quinquenniums the proportion has, however, decreased. It may here be remarked that a considerable part of our exports to Denmark in reality are exports to England through Denmark as an intermediary. — Half a century ago England was not by far of such significance as a market for our products as has been the case during the last few decades, especially through the vivid development of our timber trade.

Our exports to Great Britain and Ireland consist of unwrought timber, paper, wood-pulp, joinery, glass, matches, butter, rolled bars, other iron and steel, etc. The imports from Great Britain consist of coal and coke, cotton, wool, shoddy, woolen yarn, cotton yarn, and thread, oils, iron and steel, copper, machinery, vessels and boats, leather, etc. If due consideration be given to the Swedish export passing through Danish parts, it will be found that nearly all the butter and pork we are able to dispose of, and the greater portion of our iron, steel, and timberware, goes to England. On the other hand, we take from this country almost all the fossil coal imported in Sweden, the greatest part of leather purchased, and the greater part of the raw materials for spinning purposes, to which is added a great number of diverse articles of minor importance.

Our exports to the **German Empire** consist of unwrought timber, joinery, stone, matches, iron-ore, bar-iron, other iron and steel, herring, etc. The imports consist of coffee, tobacco, hops, pork, wheat and rye, seed, wool, colours, paints and dyeing materials, cotton, woollen goods, silk goods, clothes, hides, fertilizers, iron and steel, machinery, copper, etc.

Germany, with which country we have stood in the closest mercantile relationship ever since the days of the Hanseatic League, is of importance to us principally for the considerable imports from this country, partly of articles of nutrition or indulgence (the greatest part of our imports of wheat as well as a considerable part of rye, the greatest part of coffee and tobacco, and nearly all the hops consumed at our breweries), partly of raw materials for the textile industry (nearly as much wool and more jute than from Great Britain), and finally of a great number of manufactures, first and foremost articles of clothing, besides numerous products of the first-class metal and chemical industries of Germany.

Exports to **Denmark** embrace unwrought timber, butter, pork, earthenware, bar-iron, iron and steel manufactures, etc. On the other hand,

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TABLE 134. *Sweden's Imports and Exports, in 1900, from and to various countries, according to groups of articles.* Thousands of Kronor à 1·10 shilling.

Groups of articles.	Imports from	Exports to	Imports from	Exports to	Imports from	Exports to	Imports from	Exports to
	United Kingd.		**Germany.**		**Denmark.**		**Norway.**[5]	
Live animals	47	—	122	3	325	1,113	447	289
Animal food	2,344	20,566	4,654	1,729	3,194	18,470	13,006	276
Cereals	572	648	25,310	78	6,647	406	402	540
Colonial products	4,535	99	25,762	113	7,282	49	358	23
Fruits, garden prod.	818	16	7,138	1,802	1,940	30	99	13
Liquors	517	9	845	54	928	150	52	8
Raw textile material	11,373	12	13,113	37	3,866	127	125	4
Yarn, thread, etc.	8,076	101	5,296	19	1,153	176	132	825
Textiles[3]	9,263	355	25,832	211	5,468	487	398	317
Hair, hides, etc.	3,899	500	8,744	2,119	4,071	1,721	915	59
Id., manufactures	488	2	1,811	64	375	21	68	162
Oils, tallow, tar, etc.	6,463	111	4,560	207	5,877	98	526	66
Id., manufact. of	237	25	1,084	52	258	346	20	212
Timber	44	72,248	148	16,520	82	10,541	194	331
Id., manufactures	55	26,015	969	8,112	240	1,638	143	2,377
Colours and paints[1]	320	13	4,344	13	206	85	18	17
Div. veget. matters	1,234	6	4,958	63	3,292	189	147	10
Paper[2]	633	10,846	2,573	1,864	411	609	21	99
Div. veget. articles[3]	206	41	1,586	89	425	138	21	48
Minerals	85,286	1,646	10,887	7,113	1,496	1,265	1,937	99
Id., manufactures	600	3,542	2,573	6,355	662	2,737	384	406
Metals	17,637	23,775	3,968	12,991	1,561	2,861	693	204
Metal goods	8,123	4,004	12,510	2,701	3,964	1,441	286	492
Machinery[4]	12,721	4,147	14,920	2,524	6,884	2,140	779	213
Coin	369	—	9	—	9	—	211	—
Other articles	644	520	4,181	427	1,959	799	381	97
Total	**176,504**	**169,248**	**187,898**	**65,245**	**62,525**	**47,682**	**21,762**	**7,187**
	France.		**Netherlands.**		**Belgium.**		**Russia.**	
Live animals	3	—	2	—	—	—	1	—
Animal food	532	2	837	24	207	171	1,539	56
Cereals	242	393	275	—	546	5	16,965	1
Colonial products	2,330	—	2,601	—	742	44	3	—
Fruits, garden prod.	685	—	155	—	62	—	140	—
Liquors	3,341	—	1,429	—	102	1	—	1
Raw textile material	46	—	205	—	1,139	—	500	—
Yarn, thread, etc.	17	—	90	—	989	—	25	—
Textiles	63	—	133	1	748	12	14	1
Hair, hides, etc.	425	400	142	266	628	36	290	4
Id., manufactures	8	—	29	1	62	—	62	—
Oils, tallow, tar, etc.	457	190	879	226	1,476	84	1,970	2
Id., manufact. of	28	—	21	—	32	—	1,476	—
Timber	—	22,619	36	15,326	3	4,721	542	—
Id., manufactures	49	1,842	26	1,980	14	3,184	4	—
Colours and paints[1]	84	—	676	21	552	1	—	8
Div. veget. matters	738	—	409	—	246	—	2,516	—
Paper[2]	24	22	406	381	167	433	—	16
Div. veget. articles[3]	80	—	10	4	82	—	11	3
Minerals	129	470	1,017	8,156	591	2,165	32	902
Id., manufactures	33	1	27	47	605	19	—	444
Metals	29	3,600	666	3,122	969	3,238	—	978
Metal goods	199	116	677	41	2,811	348	46	185
Machinery[4]	96	148	403	306	340	371	57	763
Coin	—	—	—	—	—	—	—	—
Other articles	54	4	34	36	53	7	28	326
Total	**9,692**	**29,807**	**11,185**	**29,941**	**13,166**	**14,839**	**26,221**	**3,690**

[1] And dyeing materials. — [2] And articles made af paper. — [3] Articles made from vegetable matters. — [4] Instruments, vessels, carriages, etc., inclusive. — [5] The figures for the *exports* to Norway are very incomplete, see p. 928. The total figure might have been 27 million kronor instead of 7 million: cf. Table 135, p. 928.

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we import from this country coffee, wheat, maize, petroleum, other oils, as well as linseed cakes, cotton, woolen and cotton fabrics, hides and skins, furs, machinery, implements, etc. From olden times Sweden has been in brisk mercantile relationship with Denmark. Our considerable export nowadays to Denmark of butter and pork only means further forwarding to England; and with regard to import goods from Denmark, cereals, machinery, and tools, etc., they, as a rule, come from Germany, and the colonial wares from Germany and other countries more distant.

To **Norway** Sweden exports cattle and certain kinds of farm products, further cotton and woolen fabrics, yarn, wood-pulp, joinery, deals and battens, iron and steel wares, machinery, tools, etc. The import goods from this country are fish, pork, margarine, hides, skins, etc., as well as sundry manufactures, the greatest portion of them in reality having their origin from England.

With reference to the trade between Sweden and Norway certain facilities were already conceded during the early period of the Union, and in 1874 a *Commercial Treaty* was signed, according to which goods of Swedish or Norwegian manufacture should (with a few exceptions) be imported *free of duty* into the other country. Since Sweden has adopted a new system of customs dues and Norway has declined to make the alterations in the Treaty necessary for preventing misuse of the differences of the customs-rates, the Treaty was recalled by Sweden and ceased to be in force in July 1897.

The *export* from Sweden to Norway has not until 1902 been completely entered in our commercial statistics, as every provision regarding account of export *by land* has been wanting — where no especial grounds have occasioned such accounts. As long as the above-mentioned Treaty remained in force, such grounds certainly were of common occurrence, owing to the exemption of duty which could be gained by declaring the merchandise as Swedish; but subsequent to the annulling of the Treaty, the exporter seldom gains any advantage by declaration to the custom-house officers, in consequence of which the result naturally has become that the statements have grown considerably less complete than before. From 1902 inclusive, these defects are, however, remedied in the Swedish statistics, the declaration before the Custome Officers being now obligatory. The subjoined Table, which shows Sweden's export to Norway according to Swedish statistics on the one side and according to the Norwegian statistics on the other, clearly illustrates these matters.

TABLE 135. *Sweden's Exports to Norway, according to Swedish and to Norwegian Statistics.* Value in Kronor.

Years.	The Exports by Sea.		The Exports by Land.		Total.	
	Swedish figures.	Norwegian figures.	Swedish figures.	Norwegian figures.	Swedish figures.	Norwegian figures.
1894	10,236,041	9,584,500	5,032,675	19,848,400	15,268,716	29,432,900
1895	12,323,973	11,150,100	5,729,818	22,385,000	18,053,791	33,535,100
1896	13,558,229	12,060,900	5,990,181	26,231,300	19,548,410	38,292,200
1897	14,178,003	13,696,900	6,461,430	28,580,900	20,639,433	42,277,800
1898	4,913,303	5,972,000	635,704	17,646,100	5,549,007	23,618,100
1899	5,389,350	6,037,900	1,061,702	19,529,600	6,451,052	25,567,500
1900	4,784,312	5,663,500	2,402,281	21,500,000	7,186,593	27,163,500
1901	4,918,757	5,868,500	1,734,174	18,160,000	6,652,931	24,028,500
1902	5,383,000	6,376,000	18,953,000	17,967,000	24,336,000	24,343,000

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From this Table it is apparent that Sweden's export to Norway during the years 1897/1901 has not by any means decreased as greatly as might be supposed from our own commercial statistics. The export in 1901, e. g., was in reality almost as great as that of 1894, notwithstanding the fact proceeding from the Swedish statistics of its being less than half the amount. The fact thus shown is worth remembering when studying the commerce between the two countries. Besides, as our exports to Norway, to a great measure, embrace, articles which we do not export to other countries, sudden diminutions in export values appear in a number of articles, which diminutions, according to what has been now shown, are not true in reality.

As to the *recalling of the Commerce Treaty* between Sweden and Norway, this was of course done in order to prevent the Norwegian articles from gaining advantage in the Swedish market over our own, owing to Norway's often lower custom rates. Sweden did all that possibly could be done, compatibly with her economic interests to bring about an agreement. The claims of the other contrahent did, however, go beyond this.

Next to Great Britain, **France** is our greatest purchaser of unwrought timber and a rather considerable buyer of iron and steel as well as wood-pulp. On the other hand, cognac, wine, linseed cakes, coffee, preserves, etc., are imported from France.

Sweden exports to the **Netherlands** great quantities of timber, — among this the greatest part of our large timber, — as well as the greatest part of our iron ore (for further forwarding to Germany), and, moreover, pig iron, bar iron, etc. The imports from this country consist of coffee, tobacco, arrack, oils (not fossil), etc. — Our exports to **Belgium** especially embrace timber (wrought and unwrought); further metals, zinc ore, etc. From Belgium we import textile materials, oils, metal goods, and numerous other articles, though in smaller quantities.

Sweden imports from **Finland** principally unwrought timber, which is floated across the sea, and also other articles, though to a less extent. The exports to Finland chiefly consist of iron and steel, machinery, tools and implements, etc.

Sweden's exports to **Russia** consist of iron and steel, machinery, steam-boats, etc. On the other hand, rye, wheat, eggs, flax and hemp, rubber, petroleum, linseed cakes, etc., are imported from Russia.

The countries **not specified** in Table 134 embraced, during the years 1861/65, about 13·5 % of our whole commerce. That our share since has gone down to 4·3 %, undoubtedly gives evidence of the need to extend our *direct* communications by sea with distant countries, a need to which of recent years attention has been called more and more.

Customs.

As mentioned above, Sweden embraced during the years 1865/88 a system of moderate free trade but has since 1888 returned to a more protectionistic customs tariff.

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TABLE 136. *Imports and Import duties, averages for 1891/95.*
(A krona = 1·10 shilling or 0·268 dollar.)

Countries.	Mean population.	Special Imports. Kronor.	Import duties. Kronor.	Import duties. Per inh. Kronor.	Import duties. In % of the imports.
Sweden	4,832,000	351,600,000	37,372,000	7·73	10·6
Norway	2,022,000	203,100,000	20,051,000	9·91	9·9
Denmark	2,226,000	295,400,000	24,243,000	10·89	8·2
United Kingdom	38,445,000	6,485,700,000	365,274,000	9·50	5·6
Belgium	6,235,000	1,177,800,000	24,838,000	3·98	2·1
German Empire	50,825,000	3,594,200,000	347,037,000	6·83	9·7
Austria-Hungary	42,282,000	1,010,400,000	73,198,000	1·73	7·2
Switzerland	2,999,000	629,600,000	27,108,000	9·04	4·3
France	38,424,000	2,934,900,000	308,594,000	8·03	10·5
Italy	30,631,000	830,900,000	158,414,000	5·17	19·1
Spain	17,800,000	583,300,000	83,526,000	4·69	14·3
Russia	98,600,000	900,500,000	278,516,000	2·82	30·9
Other Countries	34,636,000	3,175,100,000	154,943,000	4·47	4·9
Europe	**369,957,000**	**22,172,500,000**	**1,903,114,000**	5·14	8·6
United States	66,850,000	2,938,400,000	648,996,000	9·71	22·1

In order to give an approximate idea of the present state of our country in this respect as compared with certain other countries, some guiding data are presented in Table 136 above. From these figures it will be seen that the customs revenue in Sweden, in proportion to the population, is at present pretty high, although lower than that in Norway, Denmark, the United Kingdom, Switzerland, France, and the United States. In proportion to the total value of imports, the customs duties of Sweden are considerably lower than those of Italy, Russia, Spain, and the United States, and only inconsiderably higher than those of Norway, Germany and France.

Even if a full presentation of this subject would require an investigation on the proportion, in each case, between the imports and the home production, still the above is sufficient to show that the present Swedish Customs tariff is not, as a whole, among those of a very decided protectionistic character.

How the conditions in our country have varied in this respect during different times, will be seen from the following figures:

Average.	Mean population.	Imports. Value, Kronor.	Import duties, Kronor.	Import duties. Per inh. Kronor.	Import duties. In % of the imports.
1841/50	3,306,000	32,774,000	5,983,000	1·81	18·3 %
1851/60	3,642,000	70,549,000	10,270,000	2·82	14·6 »
1861/70	4,079,000	116,726,000	13,731,000	3·37	11·8 »
1871/80	4,387,000	257,439,000	23,690,000	5·40	9·2 »
1881/90	4,673,000	326,529,000	33,969,000	7·27	10·4 »
1891/95	4,832,000	351,633,000	37,372,000	7·73	10·6 »
1896/00	5,032,000	452,324,000	50,419,000	10·02	11·1 »
In 1898	5,036,000	455,249,000	51,363,000	10·20	11·3 »
» 1899	5,080,000	504,789,000	59,410,000	11·70	11·8 »
» 1900	5,117,000	534,935,000	56,821,000	11·10	10·6 »
» 1901	5,156,000	466,320,000	48,760,000	9·46	10·5 »
» 1902	5,187,000	505,196,005	54,960,000	10·60	10·9 »

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TABLE 137. *Import duties for the principal articles and others.* Kronor.[1]

Articles.	Average 1891/95.	Average 1896/00.	Articles.	Average 1891/95.	Average 1896/00.
Cereals	5,617,801	10,919,196	Woolen fabrics	3,049,378	3,048,841
Meat and pork	847,944	1,822,895	Cotton fabrics	1,001,001	1,422,455
Coffee	2,002,258	2,901,954	Iron and steel ware	567,421	1,149,272
Sugar	7,279,100	8,000,613	Machinery	654,521	2,556,692
Tobacco	3,764,354	4,280,181	Other articles[3]	9,052,437	13,706,381
Spirits	1,535,432	2,012,742			
Wine	872,562	2,055,298	Total	**37,372,154**	**50,418,572**
Yarn and thread[2]	1,127,945	1,542,052			

The transition to a more free system of trade during the time subsequent to 1850 here becomes very apparent. The retrogress of later years is on the other hand not so marked.

In Table 137, a survey is presented of those goods which nowadays bring the greatest customs revenue.

Table 138 shows the amounts of customs duties at our principal ports. The figures give evidence of certain peculiar conditions, which there is no opportunity here to explain in detail. It may be remarked how comparatively well *Stockholm* has been able to maintain its position in our import trade, which is somewhat unexpected as the cities in Norrland have more and more begun to take their necessaries direct from foreign countries, instead of, as before, through the Stockholm merchants. For *Gothenburg* the relative retrogress is very noticeable, owing perhaps to the circumstance that Stockholm, in its turn, has more and more resorted to supplying its needs of certain articles first-hand, which proviously were taken over Gothenburg.

TABLE 138. *Import duties, in yearly averages.* Thousands of kronor.[1]

Ports.	1861/65.	1866/70.	1871/75.	1876/80.	1881/85.	1886/90.	1891/95.	1896/00.
Stockholm	5,195	4,856	9,345	9,635	11,197	12,166	12,995	18,516
Gothenburg	4,548	4,711	6,530	7,031	8,231	8,526	8,229	10,702
Malmö	821	997	1,949	2,195	2,703	3,167	4,037	5,166
Norrköping	603	517	783	888	1,164	1,580	1,650	1,762
Gefle	201	205	442	565	772	1,186	1,028	1,371
Helsingborg	215	205	407	445	584	694	1,101	1,725
Sundsvall	104	138	345	464	845	1,382	1,378	1,317
Landskrona	292	400	445	1,087	2,108	2,031	813	570
Kalmar	349	170	191	177	167	321	515	1,155
Kristianstad	107	95	114	74	62	305	422	998
Ystad	176	130	135	163	609	1,251	1,084	614
Other ports	1,422	1,006	1,755	2,215	3,018	3,869	4,120	6,523
Total	**14,033**	**13,430**	**22,441**	**24,939**	**31,460**	**36,478**	**37,372**	**50,419**

[1] A krona = 1·10 shilling or 0·268 dollar. — [2] Ropework, etc, inclusive. — [3] Approximate figures (the total revenue of the import duties are the real amounts, while for the special articles in the Table the amounts are only estimated).

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Custom Legislation and custom Staff.

According to the Constitution, it lies within the domain of the Riksdag to determine whether an article shall be liable to duty or no, the principles for computing the duty, and its amount. *The tariff* enumerates the goods subject to duty, the computation, and the customs rates. In particular *clauses*, attached to the tariff, *respecting the application of the tariff* are embodied, among other things, regulations as to the fee for ships lying in Swedish harbours, the rules regarding the restitution of duty, when such restitution has been admitted, regulations as to ships' commission, etc. — In Sweden, there are now only *import duties*. The majority are specific; taxation according to value only occurs with respect to a small number of articles.

Restitution of duty is allowed on the import of materials and necessaries for the building, rebuilding, or repair of a vessel at a dockyard or works in Sweden, also on imports by sea of certain goods manufactured in Sweden out of raw materials from abroad, such as refined sugar, caramels, sweets, chocolate, bread, manufactured tobacco, cotton and linen stuffs, and also machine-made cotton or linen articles; also for jute texture used as packing, certain products of flour mills, and, lastly, also for any article whatsoever, when it is re-exported in a manufactured or refined state. The Royal Commerce and Navigation Committee, mentioned above, has proposed extended right to restitution of duty on materials, etc., for the building and reparation of vessels (with which dockyards should be placed on a par) and also alleviation with regard to enjoying the right.

More detailed regulations respecting the manner of Customs taxation, control over exportation of goods, penalty in case of unlawful export, and the like provisions, are found in the *Customs Statute*.

All vessels in Swedish waters are subject to the inspection of the Customs staff. Vessels coming from foreign ports are forbidden *to land* at other places on the coast of Sweden than the Customs quay or entrance to certain staple towns. The clearing of vessels and the unloading and passing through the Customs of cargoes from abroad may take place in staple towns, or, if the ship does not contain goods liable to duty, at another Customs quay.

Captains of vessels coming from foreign ports with a Swedish harbour as their destination shall be provided with »Märkrulla» (Register), which is to be delivered to the first Custom House officer who comes on board. The Register, drawn up according to a certain formula, shall contain certain information respecting the vessel, her crew and voyage, and also present a clear account of her cargo. — The inspection of the vessel is to be made on her arrival at the harbour where she is to discharge her cargo.

The owner shall deliver a written declaration of goods that have arrived with the ship, in larger towns within 8, but in other places within 4 days from the day when the Register was handed to the Customs in the place of unloading, or, if the wares have arrived from another Customs quay, 4 days from the day of arrival.

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Now the examination and entry of the goods, take place, and, for articles liable to duty, the computation of such duty. It is to be paid, or security given for it, before the goods are delivered to their owner. In any case the fees are to be paid within thirty days from delivering up the Register, or, in the case of goods directly transmitted, on the day of their arrival. This holds good, too, of vessels dues.

Besides warehousing goods in *free store-houses for victualling* vessels in Öresund, the Swedish Customs legislation only recognizes those kinds of Customs warehousing which are called Bonded and Transit warehousing. It is proposed to introduce *freestorage* and *freeports* (cf. p. 915).

In the **Bonding of goods** (Nederlag) subject to duty, after they have been officially examined, they are warehoused under lock and key of both owner and Custom House without paying duty on them, till they are removed for home consumption. Goods may also be re-exported from the warehouse or transferred to an other warehouse. The fee for bonding is one per cent of the total duty charged. The maximum time for warehousing is five years. The proprietor is allowed to look after and take care of his goods, and take samples of them in suitable small quantities. Re-packing and racking may be permitted after special examination, but only when there is danger of injury or destruction of the goods in consequence of defect in the wrapper or vessel, always to a very limited extent.

In **Transit warehousing** (Transitupplag), foreign goods are stored under lock and key of the Customs without examination on the part of same. The right of transit warehousing is only conceded to certain towns. These towns are to provide stores for the purpose. Only piece-goods may be stored in this way. The period is a year, and the fee accrues for a period of three months with 30 öre (about 4 *d.*) for the first and 15 öre (about 2 *d.*) for the following periods per Swed. hundredweight (à 94 *lbs*) of the goods. The owner must not look after or take samples of the goods stored in this manner.

With regard to sea passage and **exporting goods to foreign ports,** the lading can take place in any harbour whatsoever, provided only that notice of such lading be given to the Customs authorities in the place, or else the nearest Custom House. After the lading is effected, the captain is required to hand in a bill of cargo and the owner to deliver a declaration. These documents being handed in and fees paid, the captain is given an official discharge.

There are special laws with regard to maritime commerce abroad on decked vessels under 30 tons and open boats, and also concerning steam vessels used in foreign trade, as well as the Custom House inspection and passing of passengers' effects; and rules have been drawn up for the purpose of expediting the inspection of steamboats in regular service, and passing the goods therein.

Even with regard to maritime trade and the **consignment of goods between places within the country** there are certain Customs regulations enacted. Vessels, when they are not passenger steamers in regular service or only navigate the Customs district of their home-port, should be provided with so-called annual passports, and even goods should in certain cases be accompanied by a permit.

Even *attempts* to import articles subject to duty without proper entry of same are punished as illicit importation of goods.

The Customs staff. The local Customs administration is managed by the **General Board of Customs.** To this belongs the collection of Customs revenue, i. e., the duties, lastage, fees for bonding and transit warehousing, also fees to lighthouses, preventive service, the sending in of certain statistical returns with respect to commerce and navigation, etc.

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The Customs staff is divided on eleven *districts*, into which the Customs administration is apportioned, viz., the Central, West, South, South East, Gotland, East, North, and Inner Coast Guard districts, the Läns of Vermland and Elfsborg, and the border districts of the Läns of Kopparberg and Jemtland.

In Stockholm (Central district) and Gothenburg (West district), the local administration is divided into six branches, each under its chief: the Customs, Revenue, Confiscation and Counting House, Packing Warehouse, Bonding Office, and Coast Guard Inspection Office. In the West district, one of the chiefs of department is appointed Manager to the Customs.

In the other staple towns (for Söderköping in Mem, and for Kristianstad in Åhus) also in certain other towns and in Grisslehamn, Mon, Charlottenberg, and Storlien, there are Custom-houses, and in a number of other places, Custom-stations.

Custom-houses, where all matters connected with Customs' administration can be dealt with, are administered by Customs' administrators, Managers, or Chiefs (Tullförvaltare, Tullinspektor or Tullkammarföreståndare). At the larger there is, in addition to the Manager, a Comptroller who is equally responsible with the former. The Custom-houses in staple towns have districts assigned to them. *Custom-stations*, which have only a limited power, are provided with head overseers and overseers. Other officials are comptrollers, clerks, etc.

For *Coast Guard Service* there are Coast captains, Coast sergeants, Border riders, Coast guards, Rowers, Coast rowers, and Revenue-cutters men. In the Southern district, there is a Commander for coast guard service in Skåne, and also in the border Läns of Vermland and Elfsborg, a Guard Comptroller on the Norwegian frontier.

For charges in connection with offences against the Customs, there are special public *Prosecutors* in certain districts.

For *control over the condition of ships' gauging*, the kingdom is divided into four control-districts under the care of comptrollers of gauging. In staple towns, there are official ships'-gaugers. In Stockholm, there is also a comptroller of gauging at the General Board of Customs, who assists the Board in matters connected with ships' gauging.

Inland Commerce.

Since the restrictions of earlier times were abolished, the inland commerce of Sweden has made great progress. The total number of *merchants* in our country, amounting in 1845 to only about 7,000, had in 1902 increased to 30,224.

During the greater part of the Middle Ages and very much later, one was endeavouring practically to restrict *all* trade to the towns. In connection with this, almost every kind of commerce was forbidden in the rural districts. Already during the latter part of the 13th century, such prohibition is met with. The town markets were the only places where country people were allowed to sell their goods. In some few cases, however, trading was allowed also outside towns. In the Swedish towns, market days and fairs were arranged, some of which latter brought people from distant parts, e. g. the fairs of Uppsala, Enköping, Vesterås, Örebro, Strengnäs, Vexjö, etc. King Gustavus Vasa (1523/60) enhanced the old prohibitions of rural commerce. Thus, according to an ordinance of 1546, he who for the third time has become guilty of such commerce, should suffer penalty of death. Exception was made only regarding the northermost parts of the kingdom.

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Inasmuch as there were no towns in these parts, each parish was allowed to have some merchants; for the rest, the farmers had to go to the towns to buy and sell. Some exceptions from the severe enactments on rural commerce were, however, made later on. In 1569, for instance, the nobility was given the right of trading with their garden products.

In the early part of the reign of Gustavus Adolphus (1611/32), the principles traced in the measures of Gustavus Vasa took definite form and fixedness, and found expression in the Commercial Ordinances of 1614 and 1617. According to the former, all the inland commerce was exclusively reserved to certain towns called **Uppstäder,** while the foreign trade was left to other towns called **Stapelstäder** (Staple-towns). In the latter ordinance the stipulations were in so far altered that the staple-towns got the right of selling their goods first-hand to the farmers at the markets of the »Uppstäder», through which decree the trade of the latter was considerably diminished.

Few regents have devoted such earnest attention to the home commerce of our country as Gustavus Adolphus, even if the results did not fully correspond to the endeavours made in its behalf. The home commerce was especially checked by the so-called »Small excise», introduced in 1622 and not abolished until 1810, which was levied on all domestic goods »eatable and subject to wear and tear» that were brought to market or fair in the kingdom. This excise, however, became the principal cause to the founding of new towns, which after the example of Gustavus Adolphus was continued by the great regent during the minority of Queen Kristina: Axel Oxenstierna.

Our inland commerce long continued on the same old lines. In the early part of the so-called »Era of Liberty» (1718/72), the ordinances against rural commerce were still revived, and the farmers were forbidden to carry on shipping along the coast with sloops. Gradually, however, the heavy shackles were loosened. In 1748, the Government declared »that the Governors must not hereafter prevent the trade and industry of the towns through the issuing of any decree prohibiting the export of goods by vessels to Stockholm or other places *within* the Kingdom». After the Riksdag of 1765/66, in many respects notable for its reformatory endeavours, a law was issued on November 20, 1766, by which the farmer was declared free to carry on shipping to all places within the Kingdom, and to dispose of his goods and agricultural products at any place suitable to him. Also during the reign of Gustavus III (1771/92), the development continued in the same direction. The corn trade was made free in 1775, so that all, without regard to rank, were allowed to deal in corn, both in towns and in rural districts.

In 1832, the inland commerce of the coast population was made fully free, and the right was also given them of sailing to Finland, Norway, and Denmark. Of far greater importance were the changes introduced in 1846. Through the Commercial Ordinance of December 22, of the same year, opportunity was given to carry on trade in rural districts, though on certain conditions and at a certain distance from the towns. Through the Ordinance of June 18, 1864, the step was fully taken, and liberty of trade was granted almost without any conditions. Through later ordinances, however, *peddling* was made dependant on special permission of the governors.

The old great *fairs*, at which trading with all kinds of goods was free, have in our days lost a great deal of their importance, and are getting superseded by the more frequently recurring *market days* and *monthly meetings*, at which agricultural produce and products of home industry, etc., are offered for sale, as well as by regular *cattle markets.*

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The inland commerce of Sweden is carried on to a very great extent by means of our very numerous but frequently small *steam-boats*, which maintain a very lively traffic on our exceedingly numerous lakes and water-courses, and along the coast. During the last few decades, however, the *railroads* have in this respect commenced a sharp competition. The *highroads*, where in older times gigantic wagon-loads in long succession were continually moving along — which cartering was the principal means of livelihood in large districts of the country — have, on the contrary, more and more lost in importance for the home trade, with exception, of course, of the more distant parts of North Sweden, where the conditions in this regard partly have retained the old stamp.

Commercial Education.

As conditions for the right of carrying on commerce in the kingdom, a Trade Statute of as far back as 1734 established a fixed period of apprenticeship (generally from 11 1/2 to 12 years), and secondly that the applicant in question should show himself, on examination by two business men, to be possessed of knowledge in commercial subjects. The employers were certainly required to give their apprentices not only opportunities for practical experience but also theoretical training in commerce; it is, however, natural that the last-named in reality was reduced to a mere nothing, and hence, with the growth of trade and the increasing importance of the body of traders and merchants, the want of actual commercial schools became more and more keenly felt.

The first educational establishment of this kind of any note must have been the Commercial School at Öringe in Halland, established towards the close of the 18th century by *Wurmb*, Secretary to the Board of Trade, doubtless the same man who had previously aided in the establishment of the Commercial School at Hamburg. The number of its pupils at one time reached 40, and many of the prominent merchants in Gothenburg at the beginning of the 19th century had received their mercantile education there. The school was closed, however, as early as 1790, owing to the bankruptcy of the founder.

The very apparent retrogression of commerce during the whole of the second and the early part of the third decade of the 19th century, caused public attention to be directed to the lack of training under which the commercial classes suffered. The Riksdag, therefore, urged upon the Crown in the session of 1823 the desirability of the establishment of commercial schools or of a central Commercial and Navigation Institute. The proposal thus made was referred to the »Wholesale-Trade Society» in Gothenburg, and gave rise to the opening, in 1826, of the *Gothenburg Commercial College* under the auspices of that society. Since 1829, it has received support to the extent of 3,000 kronor from the Town Council of the place. Not until 1860, however, did the institution begin to exercise any great activity. On the model of this, *Frans Schartau's Practical Commercial College* was founded, in 1865 in Stockholm, by the Wholesale-Trade Society of this city. Frans Schartau, after whom the school was nominated, was a Stockholm merchant, who by energetic intervention,

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in the critical year of 1857, succeeded in saving a large number of Stockholm merchants from financial ruin. Since 1893, these two colleges have been in receipt of an annual Government grant, at present amounting to 28,000 kronor. An inspector appointed by the Crown exercises superintendence over the two schools. In their organization they differ but little from one another. They most nearly resemble the North German higher commercial schools. The Governing Bodies of the schools have been careful to keep the schools abreast of those on the Continent by sending their head-masters and teachers to visit foreign schools and commercial congresses, etc.

The Gothenburg Commercial College. This institution has two divisions: a *two-years' course* and a *one-year professional course* for those pupils who have passed the final examination at a higher State College (the university entrance examination). To enter the former, it is necessary to show, on examination, the knowledge in Swedish, German, English, French, Mathematics, History and Geography that is requisite for a remove to the lower sixth class at a State College. Applicants must not exceed 18 years, unless the Governing Body see fit, for special reasons, to make an exception. For entrance to the other course, a final certificate on the scientific or on the semi-classical line of a higher State College is required, or else evidence, shown at entrance examination, of the same capacity in the subjects named as is requisite for a pass in the said final examination.

The subjects of instruction are Swedish, German, English, French, Spanish (the last-named not compulsory), Commercial Geography and the History of Commerce, Commercial Law, Political Science, Political Economy, the Science of Commerce, Book-keeping together with Office-Work and Commercial Correspondence, Commercial Arithmetic, Statistics, Physics, Chemistry, Knowledge of Merchandise, and also Stenography, Calligraphy, and Type writing. In addition to the instruction given at the school, visits are paid to factories and other industrial establishments. The *school-year* lasts from August 25 to June 15, with a holiday of 2 1/2 weeks at Christmas and one week at Easter. The hours of work are from 8 to 11 and 12 to 3; on three days in the week the premises are open in the evening for the pupils to do exercises in book-keeping.

The *teaching-staff* at present includes the head-master and 23 other masters, among them native teachers in German, English, and French. The *number of the pupils* is 179, 137 attending the two-years' course and 42 the professional course. Of the former 38 are women; women were first admitted in 1881. The average age of those entered in the first class is about 16 1/2 years. The *fees* are 320 kronor (à 1·10 shilling or 0·268 dollar) a year for the second class and the professional class, 280 kronor for the first class. There are, however, at the institute a number of scholars, at present 27, who are exempted from all payment; moreover, pupils who are known to be in need of it, may have their fees reduced to 100 kronor a year. In the current session 59 pupils enjoy this privilege. The premises of the College have a very fine building, funds for which were obtained from the so-called Renström Fund (see p. 382).

The Schartau Commercial College. This institution is situated in Stockholm, having been founded, as above mentioned, by the Wholesale-Trade Society of that city in 1865; from which society it enjoys an annual grant of 7,000 kronor. This college has likewise a two-years'

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and two one-year's courses. For those entering the first class in the *two-years' course*, it is necessary to show a remove-certificate from the fifth class on the scientific line of a State College in the subjects taught in that class which enter into the curriculum of the Commercial College, or failing such certificate, to display, on examination, corresponding acquirements. To gain entrance to the *one-year's* courses, candidates to the higher one must have passed the university entrance examination (with English as one subject), and the lower one have obtained a pass certificate in the upper sixth class on the scientific line in those subjects taught in the class which enter into the curriculum of the Commercial College.

The subjects taught are the same as in Gothenburg, but Russian is also included in the curriculum for those who desire to learn it. The school session lasts from September 1 to May 31, with the customary recess at Christmas and Easter. The *staff of teachers* includes one head-master and 19 assistant masters. The *number of pupils* is 111, 13 of them being in the higher one-year's course and 28 in the lower one-year's course. Of women there are 37. The *annual fee* is 225 kronor for each class; there are at present 22 scholars at the institute exempt from fee, while 24 pay the reduced fee of 100 kronor only. — The College possesses a building of its own; arrangements are made for the boarding of pupils under the supervision of a teacher.

Besides the two higher commercial colleges just mentioned, there are two other commercial schools of importance, one at Gefle and one at Sundsvall: The *Gefle Burgher school* (Borgarskola) and the *Sundsvall Commercial College* (Handelsinstitut). The former is under the care and superintendence of the Gefle Town Council and has a very extensive programme of studies embracing a two-years' course in commercial education; the endowment of the school amounts to one million kronor. The latter, being situated in a district abounding in sawmills, devotes special attention to book-keeping and office-work required in the timber trade.

Besides the schools above mentioned, there are, naturally, in all larger towns **Writing and book-keeping schools** in greater or lesser numbers, that give instruction to qualify for entering business life. Characteristic of them all is, first, the low standard of attainment necessary for entrance (the Common school course) and, secondly, the perfect freedom allowed in choice of subjects. As a rule, pupils can enter these schools at any time. Some of these institutions have been in existence for a long period of time and have obtained a certain degree of stability. This is the case with the Writing and Commercial School kept by *Påhlman Brothers* and the *Smedman* Commercial Schools, both in Stockholm; and with *Filip Holmqvist's* Writing and Commercial School in Gothenburg, and others. In many of these, a tolerably complete commercial education is given, embracing foreign languages, commercial law, etc.

Finally there are a number of **Sunday and Evening Schools** with a more or less mercantile curriculum, principally intended for those who have already entered business life. Foremost among these is the *Stockholm Burgher school* (Borgarskola) with about 1,500 pupils annually. The choice of subjects is entirely open. Instruction is given here in such subjects as: Book-keeping for retail and whole-

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sale concerns, together with the Correspondence involved therewith, in the Theory of Commerce, in German, English, and French, together with German and English Commercial Correspondence, and in Stenography. The school derives a grant of 14,000 kronor from the city of Stockholm, and in addition, small grants of altogether 3,900 kronor from the State, the Parishes of Stockholm, and the Stockholm Workmen's Association (Arbetareföreningen). — At Gothenburg the *Association for the Advance of Commercial Knowledge* has instituted an *Evening School*, that makes use of the rooms of the Commercial College and employs partially the same teachers. There are between 200 and 300 pupils. The subjects taught are Bookkeeping, Commercial Arithmetic, German and English (together with Correspondence) and Calligraphy.

Commercial Legislation.

The regulations in force concerning the carrying on of trade are to be found in the *Royal Ordinance of June 18, 1864*. Any and every one has unconditional liberty of carrying round for sale necessaries of life, agricultural and farm produce, and the productions of Swedish domestic industry. Anyone who has announced his intention of carrying on manufacture, or a practical trade, has likewise a right to carry round for sale, either in his own person, in that of his wife, or of anyone of his children living at home, the articles of his own manufacture, it being, however, neccessary for the person so doing to have with him a legitimation certificate as to his person (Prästbetyg) and a certificate issued by the proper authority concerning the character of the trade pursued by the one in whose behalf the goods are offered for sale. Furthermore, there is full liberty with regard to trade at fairs.

In other respects, Swedish man or woman enjoys the right to carry on trade, to export to and to import from foreign parts, and to transport goods from one place to another within the country, under the conditions and restrictions mentioned below.

For the right to carry on *wholesale trade*, or to sell goods *in a shop, or other store-house*, it is necessary to be possesser of a good character (Fräjd), to be one's own master, have control of one's property, and to apply in writing for the right to do so to the Governor of the Län (in rural districts) or to the Magistracy (in towns). Certificates with regard to the fulfilment of the conditions named must be adjoined to the application. If application is made for a *firm* in accordance with the regulations for such, the application is thereby considered to be complete, in harmony with the general statutes concerning the trade. The stipulation with regard to being one's own master and having control of one's property is *remitted* in the following cases: in the case of a married woman living with her husband; in that of person under age; in that of a tradesman who is placed under trusteeship, — provided, however, that the husband, or the trustee permits the business to be carried on and assumes responsibility for the obligations of the wife or minor or ward respectively, in connection therewith.

In certain cases, *special permission* for the carrying on of trade is requisite, thus partly in cases where a tradesman desires to dispose, in a short space of time, of a stock of commodities at some other place than the one where he has applied for the right to carry on business, and in other manner than at a fair, for instance by auction or by private sale (*Clearance Sales*), and partly where a person desires to carry round articles for sale, either in his own person or in that of another, otherwise than at a fair (*Peddling*). Together with the application for such permission, written testimonies must be handed in, to the effect

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that the tradesman himself and his assistant or assistants, intended to be employed in the selling, enjoy a reputation for honesty and orderliness. Those who have not previously made an application for the right to carry on trade are required also to hand in certificates of good character (Frājd), of being their own masters, and of having control of their property; the latter, however, is not essential for a married woman living with her husband, whose permission is, however, required. The granting of permission to hold a clearance sale as above, is combined with a charge of from 25 to 500 kronor (à 1·10 shilling). The permission can be at any time removed if due cause for such action occurs.

To the right of carrying on trade in the country, there are exceptions in regard to occupants of certain official positions such as the tax collectors, the public prosecutors, officials in the customs department; the restriction applies likewise to the wives of these officials.

In certain cases there are special regulations in force concerning the kind of business. Among these are: *a*) the selling of cornbrandy, potato spirit or any other distilled spirituous liquors, in accordance with the Law of May 24, 1895, concerning which, see the section on Temperance Movement, page 278; *b*) the selling of wine, malt liquors, prepared coffee, and other drinks of a non-alcoholic character; *c*) the trade in margarine, margarine-cheese and artificial suet; *d*) the selling of arsenic and other poisonous substances and commodities; *e*) the trade in medicaments; *f*) the trade in ether and in commodities containing either ether or spirits; *g*) the trade in explosives. It ought to be remarked that the *Book-trade* is excepted from the general trade legislation, the regulations for which are given in the statutes of the Press-Law.

The Board of Trade has to consider and determine with regard to the holding of *fairs*, their abolition, etc., and for that purpose to hear the opinion of the parties concerned. A list of fairs is published in the Almanac.

Special regulations have been drawn up and are in force with regard to the duties of a tradesman when appointing assistants in his business and concerning the care for their morality, education, and health; further particulars are given on this matter in a following section (Labour Legislation). The minimum age at which an assistant can be employed in business, is 12 years.

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XII.

SHIPPING AND NAVIGATION.

The extensive coasts of Sweden with ample supply of harbours, its many rivers, and innumerable inland lakes have naturally always made our nation a sea-faring one. Still the history of our foreign shipping shows many changes, and times of progress have not seldom been followed by a decided declination. At present the insight in the need of improvement for our shipping asserts itself more and more, as well to our tradesmen as also to the legislative authorities.

The short summary given in the preceding, concerning the history of Swedish commerce, also includes the leading features of that of shipping. Still the latter shows certain peculiar features, and, on the whole, it is of course not necessary that the shipping and the commerce of a people must show a parallel development, though this has as a rule been the case in our country.

During the famous »*Viking time*», the sea voyages of the Scandinavians were longer and more daring than those of all other peoples. When during the latter part of the Middle Ages, the wars were carried on more by land than by sea, the naval defence fell into decay, and therewith not only the old superiority at sea of the Scandinavian peoples ceased, but for a certain time also the seamanworthiness of the people and their taste for navigation too. Instead of the Scandinavians, the Hansards became masters of the Baltic and North Sea, and possessed themselves of shipping as well as commerce. King *Gustavus Vasa* (1523/60) tried to revive in his Swedish people the former skill in seamanship and naval architecture, and how he partly succeeded is already mentioned above.

During the seventeenth century great efforts were made by regents and statesmen to help up our shipping, and partly with success. That the result was not better, depended principally upon the unequal competition with the Dutch.

The wars of Charles XII (1697/1718) were as ruining for our shipping as for our other trades. In the beginning of the decade 1721/30 the Swedish merchant fleet is said to have numbered only about a hundred vessels. After the issuing of the above mentioned »Proclamation» of 1724, it, however, make such a rapid progress that already towards 1730 it amounted to about five hundred vessels. Through the East India Company (page 912) our shipping on distant countries was also considerably advanced. A splendid time was entered.

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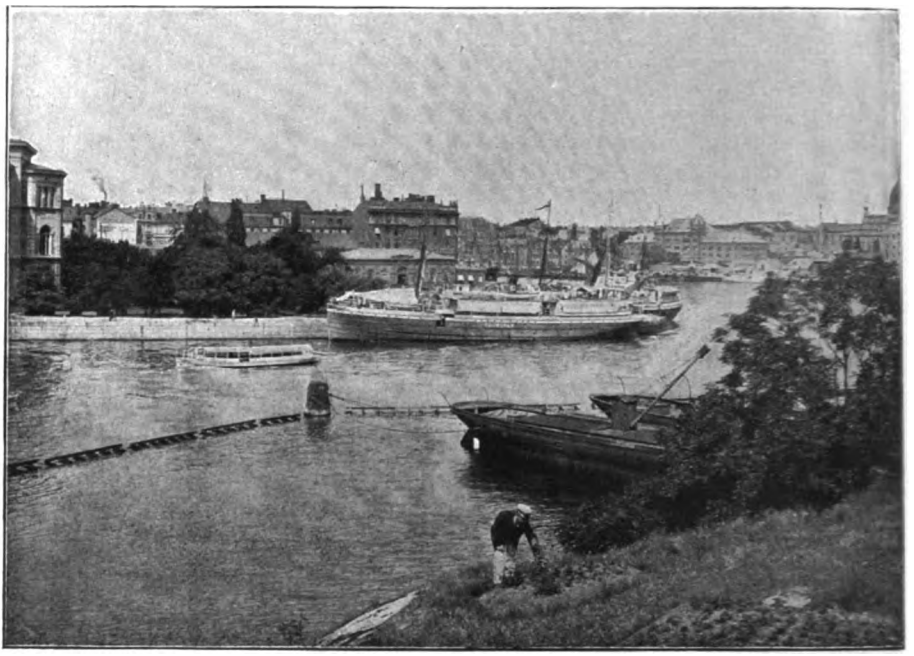
upon during the American war of independence (1775/83), in which the greater maritime powers were gradually involved, owing to which their shipping decreased, to the benefit of the neutral powers. As already indicated before, the Swedish shipping probably has never been more profitable than during that time.



The Norra Blasieholmen harbour in Stockholm.

During the long period of peace which Sweden has enjoyed since 1814, its shipping has undergone no small development, although its relative importance scarcely is the same as during certain preceding epochs. Of all merchant fleets the Swedish one held in 1850 about 2·66 per cent — reckoned according to the »reduced» tonnage (see Table 139), and using the maritime statistics of A. N. KIÆR. In 1865, our share had gone down to 1·92 per cent. During the next decade, more especially during the beginning of the decade 1871/80, a tremendous rise occurred, which in 1875 carried us on to 3·22 per cent of the world's tonnage, but after that came twenty years that constituted one of the weakest chapters in the modern history of our shipping. And though there has been evident improvement during the last few years, the merchant fleet of Sweden at present scarcely exceeds 2 per cent of the total stated for all the sea-faring nations. — The course of development during the whole latter part of the nineteenth century appears in Table 139 on the following page.

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TABLE 139. *The Commercial Navy of Sweden, in 1850/1901.*

(Before 1895 all vessels; from 1895 inclusive, vessels of 20 tons and above.)

At the end of	Number of vessels.	Total tonnage.[1]	Sailing Vessels.	Steam Vessels.			«Reduced» tonnage.[2]	Steam Vessels in %.[3]
			Tonnage.	Tonnage.	Id. multiplied with 3.	Nominal horse-power.		
1850	2,744	205,800	201,800	4,000	12,000	?	**213,800**	5·6
1860	3,200	283,600	271,600	12,000	36,000	6,000	**307,600**	11·7
1870	3,376	350,200	319,300	30,900	92,700	11,601	**412,000**	22·5
1880	4,333	552,400	461,600	90,800	272,400	24,601	**734,000**	37·1
1890	3,874	510,947	369,680	141,267	423,801	37,843	**793,481**	53·4
1895	2,763	483,003	301,727	181,276	543,828	42,360	**845,555**	64·3
1900	2,987	613,792	288,687	325,105	975,315	67,317	**1,264,002**	77·2
1901	3,102	640,211	298,589	341,622	1,024,866	70,562	**1,323,455**	77·4

As in other countries, the *number* of vessels has during several of the latter years been rather reduced than increased, while the tonnage has grown — the latter still, only concerning steamers. As to sailing vessels, there appears everywhere a declination nowadays, as well with regard to number as tonnage. In Sweden the decrease of the fleet of sailing vessels, however, commenced later than in most other countries, inasmuch as with us it increased up to about 1880.

Shipping in general.

The entire shipping (home and foreign) in our Swedish ports amounted in 1901 to 269,411 vessels entered and cleared, of altogether 40,000,784 tons. These figures stand for all vessels of ten tons and more, but not for the local traffic taking place within the respective harbour itself. Of the sum above mentioned, 182,749 are *steamers*, with a tonnage of 34,049,090 tons, which corresponds to about five sixths of the sum total. The total shipping in our ports has during the ten years' period 1892/1901 increased by 37 %.

A great obstacle for Swedish shipping is, as well known, the fact of the ports in the northern parts of our country being *blocked by ice* during a great part of the year. In southern Sweden, on the other hand, the shipping can, practically spoken, be said to keep open the whole year round, as a rule.

During 1891/95, the shipping was on an average open 225 days of the year in Hernösand, 335 days in Stockholm, 358 days in Visby, and 364 in Helsingborg. A comparison with earlier days shows that, on the whole, the time during which the shipping is blocked by ice, has

[1] Register tons (Moorsom system); for the steamers, net tonnage according to the *German* Rule. So also in the following. — [2] I. e. the tonnage of the sailing vessels + 3 times that of the steam vessels. — [3] Steam vessels' tonnage, multiplied with 3, in per cent of the total «Reduced tonnage».

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TABLE 140. *The Swedish Commercial Navy, in 1901.*

Groups of tonnage. Home-ports.	Steam vessels.			Sailing vessels.		Total.		
	Number.	Tonnage.	Horse-power.	Number.	Tonnage.	Number.	Tonnage.	Reduced tonnage[1].
A) Groups.								
Of 20—50 tons	184	6,227	4,602	724	25,584	908	31,811	44,265
» 50—100 »	133	9,720	4,376	637	44,350	770	54,070	73,510
» 100—200 »	225	29,724	9,744	308	44,769	533	74,493	133,941
» 200—300 »	81	19,718	7,033	239	60,280	320	79,998	119,434
» 300—400 »	50	17,147	3,917	115	39,375	165	56,522	90,816
» 400—500 »	41	18,443	3,923	59	26,539	100	44,982	81,868
» 500—700 »	46	27,533	5,291	46	27,654	92	55,187	110,253
» 700—1,000 »	86	72,161	11,634	24	20,205	110	92,366	236,088
» 1,000—2,000 »	89	117,123	17,447	8	9,833	97	126,956	361,202
» 2,000 tons and above	8	23,826	2,595	—	—	8	23,826	71,478
Total	**943**	**341,622**	**70,562**	**2,160**	**298,589**	**3,103**	**640,211**	**1,323,455**
B) Home-ports.								
Bothnian Gulf	154	39,439	9,473	61	17,611	215	57,050	135,928
Baltic Sea	317	108,724	23,842	1,152	158,839	1,469	267,563	495,011
West-coast	323	177,748	33,117	703	109,362	1,026	287,110	642,606
Other ports[2]	149	15,711	4,130	244	12,777	393	28,488	50,910
Total	**943**	**341,622**	**70,562**	**2,160**	**298,589**	**3,103**	**640,211**	**1,323,455**
C) Principal home ports.								
Gothenburg	195	101,400	18,579	52	19,088	247	120,488	323,268
Stockholm	177	74,796	16,005	41	5,262	218	80,058	229,650
Helsingborg	46	46,448	7,782	60	13,906	106	60,354	153,250
Gefle	27	14,929	2,382	16	6,830	43	21,759	51,617
Malmö	16	8,974	2,148	26	10,185	42	19,159	37,107
Hernösand	14	6,132	1,194	5	2,343	19	8,475	20,739
Sölvesborg	8	6,276	988	8	1,363	16	7,639	20,191

been reduced of late. This is principally due to the development of the steam fleet and the building of stronger vessels, some of which are especially constructed for winter traffic. Our most important towns have provided themselves with *ice-breakers*.

Concerning Swedish *ports* and docks, *canals*, and fairways, some informations are given under special headings in the following.

Shipping between Sweden and foreign countries.

The extent of Swedish foreign shipping, i. e., the number and tonnage of vessels having left Sweden for foreign ports or arrived in Sweden from foreign ports, is shown in Table 141 for the period after 1875. The medium for the years 1876/80, of the whole tonnage for such vessels entered and cleared out, amounted to 6·43 million tons. In 1901, 16·57 million tons had been reached.

On the whole, the shipping on Swedish ports is, in proportion to the population of the country, extremely great. At a medium for the

[1] The tonnage of the sailing vessels + 3 times that of the steam vessels; cf. Table 139. — [2] On the inland lakes.

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TABLE 141. *Vessels entered from and cleared for foreign countries.*

Average for the years	Entered.		Cleared.		Total.	
	Vessels.	Tonnage.	Vessels.	Tonnage.	Vessels.	Tonnage.
1876/80	21,919	3,196,448	21,472	3,231,885	43,391	6,428,333
1881/85	27,611	4,226,782	26,182	4,204,253	53,793	8,431,035
1886/90	28,640	4,934,938	27,012	4,933,878	55,652	9,868,816
1891/95	30,241	5,931,836	29,485	5,970,121	59,726	11,901,957
1896/00	34,140	7,781,894	34,179	7,793,822	68,319	15,575,716
In 1898	34,702	7,700,352	34,621	7,672,739	69,323	15,373,091
» 1899	34,208	8,185,511	34,292	8,199,236	68,500	16,384,747
» 1900	36,262	8,543,539	36,300	8,579,587	72,562	17,123,126
» 1901	35,356	8,337,982	34,520	8,228,717	69,876	16,566,699

years 1896/1900, it amounted to about 300 tons for each hundred of inhabitants. In the whole of Europe only Denmark and the Netherlands show higher figures than these; even Great Britain and Ireland stop at about 230 tons per a hundred inhabitant. Remembering besides that *home-shipping* is more extensive in Sweden than in the countries just mentioned, which surpass us with regard to foreign shipping, the result will be that the total shipping on Swedish ports, in proportion to the population, is livelier perhaps than in any other European country.

The cause of this condition is that the merchandise turned over by Sweden is to a great extent of a very voluminous nature. This holds good already about the imports, of which fossil coal is the chief article of all; but it is especially appliable to our exports, which, as well known, mostly consist of timber, minerals, and metals.

The circumstance just now stated causes Sweden to be of far greater international importance as a consumer of tonnage than as regards commerce. According to KIÆR'S investigations, it is probable that at present no article in the commerce of the world requires so great a ship-tonnage for its carriage as timber does; and of this article our country is, as everybody knows, the greatest seller of all. Also in the coal commerce, Sweden plays an important part. Among the customers of England, only Germany, France, and Italy buy more of this article than Sweden does.

Remembering this, it ought to be evident that, at the conclusion of commercial and maritime treaties, Sweden, because of its important position in shipping — as a great consumer of tonnage — has considerably higher trumps on hand than might be expected from its comparatively small importance as regards commerce.

Table 143 shows how our foreign shipping is distributed on **steamers and sailing vessels.** In 1876/80, steamers of altogether 2·60 million tons were entered and cleared out; in 1901, the figure had risen to 13·99 million. The tonnage of sailing vessels, on the other hand, has during the same time decreased from 3·83 million tons to only 2·58 million.

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TABLE 142. *Vessels entered from and cleared for foreign countries. Swedish vessels and foreign.*

Average for the years	Swedish.		Foreign.		Thousands of tons.			
					Steam vessels.		Sailing vessels.	
	Vessels.	Tonnage.	Vessels.	Tonnage.	Swedish.	Foreign.	Swedish.	Foreign.
1876/80.....	19,565	2,271,437	23,826	4,156,896	1,056	1,545	1,216	2,611
1881/85.....	25,953	3,036,018	27,840	5,395,017	1,726	3,027	1,311	2,368
1886/90.....	25,149	3,454,269	30,503	6,414,547	2,206	4,616	1,248	1,799
1891/95.....	28,623	4,011,511	31,103	7,890,446	2,678	6,316	1,334	1,574
1896/00.....	34,860	5,805,671	33,459	9,770,045	4,356	8,471	1,450	1,299
In 1898.....	35,525	5,719,400	33,798	9,653,691	4,232	8,375	1,488	1,278
» 1899.....	35,044	6.271,039	33,456	10,113,708	4,838	8,960	1,433	1,154
» 1900.....	39,001	7,118,613	33,561	10,004,513	5,565	8,697	1,553	1,308
» 1901.....	39,173	7,576,867	30,703	8,989,832	6,134	7,857	1,443	1,133

As to **nationality** the shipping was divided in the way shown in Tables 142—144. On an average, for the years 1876/80, vessels with a tonnage of altogether 2·27 million tons flew the Swedish flag. In 1901, the figure had grown to 7·58 million tons. The tonnage of foreign vessels has during the same time grown from 4·16 million to 8·99 million tons. In per cent of the sum total, the Swedish vessels comprised during the first mentioned period 35 per cent, and in 1901 about 46 per cent, thus a remarkable amelioration.

Of foreign vessels, the *Danish* ones are especially conspicuous through an enormous increase in number and tonnage. In 1870, only 6 per cent of Swedish maritime trade was effected by Danish vessels whereas, in 1901, 19 per cent. These figures bear witness of deplorable omissions concerning the guarding of our maritime interests in Öresund.

Of other foreign vessels, the *Norwegian* show a strong declination. In 1870, no less than 34 % of our foreign maritime communication was kept up by them but, in 1901, only 10 %. On the contrary, the share of the *German* vessels has during the same time increased from 3 ½ to 10 per cent. Concerning the *English* vessels, great fluctuations appear. In 1870, 14 % of our foreign shipping was kept up by them, in 1880 about the same, but in 1890 more than 20 %. In 1901, their share had again gone down to 9 %.

To what extent our import and export are mediated by Swedish vessels or by foreign ones, is shown from *another* point of view by those commercial statistics which effect the said distribution with regard to the *value* of the exchange of commodities. The results are shown for a certain length of time in Table 146, page 949. Evidently the share is here considerably higher for the Swedish vessels than it was in the calculation referring to the tonnage, from which we conclude that principally voluminous goods (timber, ore, mineral coal) are transported by foreign vessels.

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TABLE 143. *Foreign Navigation. Swedish and foreign vessels.* Specifications.*

Average for the years	Steam Vessels. In thousands of tons.					Sailing Vessels. In thousands of tons.				
	Entered.		Cleared.		Total.	Entered.		Cleared.		Total.
	With cargoes.	In ballast.	With cargoes.	In ballast.		With cargoes.	In ballast.	With cargoes.	In ballast.	
A) *Total tonnage.*										
1876/80	815	477	771	538	**2,601**	601	1,303	1,816	107	**3,827**
1881/85	1,374	1,009	1,511	859	**4,753**	578	1,266	1,730	104	**3,678**
1886/90	1,704	1,708	2,246	1,164	**6,822**	552	971	1,430	94	**3,047**
1891/95	2,044	2,433	3,208	1,309	**8,994**	571	884	1,349	104	**2,908**
1896/00	2,739	3,673	4,266	2,149	**12,827**	600	770	1,266	113	**2,749**
In 1901	2,986	4,052	4,406	2,547	**13,991**	560	740	1,142	134	**2,576**
B) *Swedish Vessels.*										
1876/80	441	79	404	132	**1,056**	238	363	589	26	**1,216**
1881/85	746	116	652	211	**1,725**	243	416	620	32	**1,311**
1886/90	853	251	833	270	**2,207**	267	355	599	27	**1,248**
1891/95	968	363	1,134	214	**2,679**	295	372	633	32	**1,332**
1896/00	1,493	682	1,627	554	**4,356**	359	366	674	51	**1,450**
In 1901	1,756	1,350	2,056	972	**6,134**	339	396	655	53	**1,443**
C) *Foreign Vessels.*										
1876/80	374	398	367	406	**1,545**	363	940	1,227	81	**2,611**
1881/85	628	893	859	648	**3,028**	335	850	1,110	72	**2,367**
1886/90	851	1,457	1,413	894	**4,615**	285	616	831	67	**1,799**
1891/95	1,076	2,070	2,074	1,095	**6,315**	276	512	716	72	**1,576**
1896/00	1,246	2,991	2,639	1,595	**8,471**	241	404	592	62	**1,299**
In 1901	1,230	2,702	2,350	1,575	**7,857**	221	344	487	81	**1,133**
British Vessels.										
1876/80	147	89	204	38	478	65	52	111	6	234
1881/85	313	292	550	54	1,209	27	31	53	3	114
1886/90	476	510	912	75	1,973	11	19	31	1	62
1891/95	569	618	1,097	96	2,380	6	8	13	1	28
1896/00	498	529	937	94	2,058	3	5	6	—	14
In 1901	436	294	681	100	1,461	1	7	7	—	15

In 1901, the navigation on our *neighbouring countries* on the Baltic and the North Sea (Norway, Denmark, Finland, Russia, the German Empire, the British islands, the Netherlands, and Belgium) amounted to 94·75 %. The navigation on France amounted to 2·51 %, on the remaining parts of Europe to 0·85 %, on Africa to 0·93 %, on America to 0·67 %, on Australia to 0·14 %, and on Asia to 0·15 %.

Direct Swedish steam-boat lines, on which the traffic at least partly is carried on by Swedish vessels, only exist to a few places in Europe. Of these lines we may mention the so-called *Kontinentalrouten* (the Continental route), which, with subventions from the Swedish and the German Governments, keeps up steamer communication all the year round between Trelleborg in Skåne and the watering-place of Sassnitz on Rügen. Thus a comfortable connection is since 1897 arranged between the railway-lines of Sweden and those of the Continent. The passage Trelleborg-Sassnitz takes about 4 hours, and the

* By vessels in ballast are meant those whose cargo is less than one tenth of the net tonnage. Most of the passenger steamers consequently come under this head. — Tables 142 and 143 show slight differences owing to certain figures being rounded off.

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TABLE 144. *Shipping Communication with different countries, in 1901.*
In Thousands of tons.

From and to	Vessels with cargoes.			Vessels in ballast.			Total.		
	Swedish.	Foreign.	Total.	Swedish.	Foreign.	Total.	Swedish.	Foreign.	Total.
Norway	157	40	197	101	146	247	258	186	444
Denmark	561	561	1,122	1,392	2,373	3,765	1,953	2,934	4,887
Finland	31	113	144	54	280	334	85	393	478
United Kingd.	2,438	1,651	4,089	258	247	505	2,696	1,898	4,594
Netherlands	227	591	818	40	239	279	267	830	1,097
Belgium	173	69	242	31	26	57	204	95	299
German Empire	853	638	1,491	803	1,108	1,911	1,656	1,746	3,402
France	170	214	384	12	19	31	182	233	415
Russia	95	86	181	80	235	315	175	321	496
United States	—	80	80	—	21	21	—	101	101
Other countries	101	245	346	—	8	8	101	253	354
Total	4,806	4,288	9,094	2,771	4,702	7,473	7,577	8,990	16,567

whole journey from Stockholm to Berlin, during the summer months 24 hours, in winter 26 hours. — We notice furthermore the regular line *Gothenburg—Malmö—Copenhagen—Lübeck.*

Since 1891, regular *steam-ferry* communication is arranged across Öresund between Helsingborg in Sweden and Helsingör in Denmark, and since 1895 between Malmö and Copenhagen. The former is kept up by Danish ferries, the latter by Swedish and Danish ones conjointly.

TABLE 145. *Foreign shipping in 1901, according to Ports.* [1]

Ports.	Total tonnage.	Ports.	Total tonnage.	Ports.	Total tonnage.
Luleå	1,198,553	Karlskrona	148,024	Malmö	2,909,933
Sundsvall	634,596	Karlshamn	128,776	Gothenburg	2,169,123
Gefle	634,408	Oskarshamn	127,796	Helsingborg	1,842,428
Hernösand	468,320	Kristianstad	119,414	Halmstad	284,371
Söderhamn	292,806	Ystad	106,923	Landskrona	280,388
Umeå	183,786	Vestervik	83,286	Uddevalla	267,800
Skellefteå	170,723	Visby	79,088	Strömstad	255,614
Hudiksvall	154,655	Ronneby	39,702	Varberg	63,136
Örnsköldsvik	153,868	Söderköping	39,265	Falkenberg	50,174
Haparanda	146,949	Simrishamn	31,191	Karlstad	20,890
Piteå	62,467	Sölvesborg	28,615	Marstrand	15,241
		Vesterås	19,584	Lidköping	104
Norrland	4,101,126	Södertelge	14,179	Kungelf	—
		Vadstena	1,301		
Stockholm	1,223,026	Jönköping	327	West coast	8,159,202
Trelleborg	1,016,084	Uppsala	50		
Nyköping	645,298	Linköping	—	*Total*	16,566,069
Kalmar	234,268				
Norrköping	220,174	East coast	4,306,371		

[1] Total tonnage of vessels entered and cleared in foreign shipping.

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Swedish Vessels in Foreign shipping.

It has been mentioned already that of the whole tonnage for vessels arrived and departed, in 1901, in and from Sweden — which figures amounted to 16,566,699 tons — 7,576,867 fell to *Swedish vessels*.

This is *one* side of the activity exercised during that year in foreign shipping by the vessels of the Swedish merchant fleet. The *other* side naturally is the voyages which Swedish vessels undertake between foreign countries reciprocally — which voyages consequently don't touch Sweden, and thus are not included in »the foreign shipping of Sweden». Here we will give some principal facts concerning each of these two branches.

A) Concerning the part our vessels take in the maritime trade **between our own country and others**, it is already accounted for in the division just completed, regarding the number and tonnage of the vessels as well as the most important countries for arrivals and departures. What might be added here, is the amount of the *gross freights* gained on such voyages, about which informations are hitherto gathered by the consuls concerning our own vessels, but naturally not concerning the foreign ones. As we have no consuls in Norway, informations are not to be had concerning the gross freights for the voyages of Swedish vessels to and from that country. From above mentioned 7,576,867 tons, we consequently must in the account deduct the tonnage for the voyages on Norway. With smaller deductions besides, and as informations are given only concerning *loaded* vessels (see the note on p. 947), our dates for 1901 embrace Swedish vessels entered and cleared out, of

TABLE 146. *Distribution of Imports and Exports (according to value) among Swedish and Foreign Vessels and Transport by land.*

Average for the years	Imports. Value in %.					Exports. Value in %.				
	Swedish vessels.	Norwegian vessels.	Other vessels.	By land.	Total.	Swedish vessels.	Norwegian vessels.	Other vessels.	By land. [1]	Total.
1862/65	49·66	6·57	42·90	0·87	100	40·75	26·85	31·95	0·45	100
1866/70	47·20	6·98	44·42	1·40	100	37·65	22·31	38·76	1·28	100
1871/75	52·22	4·70	40·88	2·20	100	40·98	19·48	38·52	1·02	100
1876/80	51·88	5·64	40·22	2·26	100	43·00	15·95	39·76	1·29	100
1881/85	51·76	5·97	38·82	3·45	100	42·68	11·78	44·16	1·38	100
1886/90	53·12	5·06	37·39	4·43	100	43·85	6·98	47·53	1·64	100
1891/95	50·85	5·62	39·29	4·24	100	41·25	7·28	49·67	1·80	100
1896/00	55·18	4·51	37·71	2·60	100	45·49	9·30	44·29	0·92	100
In 1901	56·65	3·54	37·43	2·38	100	50·59	8·86	40·06	0·49	100
» 1902	54·99	4·12	38·74	2·15	100	47·24	7·72	40·21	4·83	100

[1] The returns regarding *exports* by land, previously to 1902, are very incomplete, especially for the years 1897/1901, see p. 928. For 1902, the figures are, on the contrary, complete, hence the great increase for that year.

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TABLE 147. *Total Foreign Shipping by Swedish Vessels.*

Average for the years	Total Shipping. Vessels entered and cleared.		Total Tonnage. In Thousands of tons.				Gross freights. Thousands of Kronor.[1]		
	Number.	Tonnage.	With cargoes.	In ballast.	Steam vessels.	Sailing vessels.	Total.	Between Sweden and Foreign ports.	Between Foreign ports.
1876/80.....	22,256	4,472,951	3,238	1,235	1,997	2,476	**35,514**	18,965	16,549
1881/85	25,917	5,242,730	3,928	1,315	2,778	2,465	**33,916**	19,652	14,264
1886/90.....	28,942	6,701,704	4,864	1,838	4,393	2,309	**33,428**	20,877	12,551
1891/95.....	30,786	7,779,571	5,473	2,307	5,546	2,234	**32,520**	21,993	10,527
1896/00.....	36,385	10,635,624	7,294	3,342	8,530	2,106	**47,331**	34,179	13,152
In 1898....	36,373	10,275,024	6,998	3,277	8,192	2,083	**45,414**	33,350	12,064
» 1899....	36,657	11,479,440	7,842	3,637	9,437	2,042	**52,208**	37,822	14,386
» 1900....	38,836	12,954,265	8,679	4,275	10,819	2,135	**61,066**	42,977	18,089
» 1901....	40,531	14,288,772	9,846	4,443	12,287	2,002	**51,971**	36,189	15,782

4,219,816 tons. The whole amount of gross freights was for these vessels (counted on arrival) 36,189,215 kronor. Of this amount, 18,962,095 kronor were for voyages to and from Great Britain and Ireland, 6,228,469 kronor for voyages to and from the German Empire, 2,343,132 kronor for the traffic on France, 2,036,637 for Denmark, 1,952,975 for the Netherlands, 1,690,569 for Belgium, etc. On all the other parts of the world fell only 2,975,338 kronor.

B) The trading of Swedish vessels **between foreign countries reciprocally** is known, in case a Swedish-Norwegian consular station is visited during the voyage. During 1901, these consulates reported upon the arrival and departure of about 12,800 Swedish vessels bent upon such voyages, of altogether more than 7,000,000 tons. The gross freights amounted to 15,781,714 kronor. Of this about 4·7 million kronor are stated to be from English ports, from German ones about 2·3 million, and from non-European parts of the world about 1·8 million kronor altogether.

A summary of the foreign shipping of the Swedish merchant fleet is given in Table 147 above. The Table evidently indicates a progress when comprising the whole, although the increase only falls to voyages between Sweden itself and foreign countries. Concerning the economical result, the amounts were for a long period almost stationary, or even decreasing, the cause of which is to be exclusively sought in the fall of the freight-rates. From the period 1876/80 to 1896/1900, the tonnage has grown by 138 %, but the sum total of the gross freights has during the same time only increased by 33 %. To a certain degree, this may depend upon the decrease in the number of more distant voyages. — The last few years show a considerable improvement, just as with regard to all our trades.

[1] A krona = 1·10 shilling or 0·268 dollar.

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The propositions of the Commerce and Navigation Committee.

Rather unfavourable conditions in certain cases with regard to our foreign shipping, caused, a few years ago, the appointment of the above-mentioned **Commerce and Navigation Committee,** charged with the mission of proposing such measures as may be found necessary to the helping up of commerce and navigation. Above we have already given an account of the propositions made by this Committee for the promotion of commerce, and it is evident that part of these must be of significance also to navigation. Other propositions of the Committee more directly relate to this latter; of these we will here make a brief mention.

In the communications which the local commerce and navigation delegates as well as private associations and individuals have submitted to the Committee, the principal causes of the rather unfavourable state of our navigation were unanimously pointed out as being the lack of easily accessible capital for carrying on trade in accordance with the claims of the times. At the turning-point characterized by the transition from sails to steam and the exchange of wooden vessels for iron ones, our country was unable to keep apace with the rapid development of certain other countries. With us capital has been demanded principally for other purposes: industrial establishments and, above all, for railways. What has thus been lost in the domain of navigation, cannot be regained without some special exertions. It will be necessary, first of all, that, in place of the many small and powerless ship-holders, such come to the fore in collected force and of sufficient capital, capable of putting at sea vessels of modern size and equipment and of surmounting casually unfavourable conjunctures, which of course cannot be altogether avoided.

In order to obtain the capital requisite, the Committee proposed a new legislation with regard to the *right of giving a mortgage on vessels;* as things were then, vessels could not be used as security for loans without being handed over as a pledge, in which case the owner was prevented from the free use of his vessel. For more directly to assure the shipping the affluence of capital, the Committee also proposed the establishment of a **Maritime Mortgage Bank;** instead of this some members of the Committee proposed a *Loan Fund* of 5 million kronor, which amount, however, ought to be brought up to 10 million kronor when necessary. — Finally, the instituting of *traveling stipends* was proposed for persons desiring in foreign countries to acquire further skill in the carrying on of a ship-holder's business.

For the revival of our navigation is of necessity also to effect a pulling up of the Swedish **shipbuilding industry,** which for several decades has been on the retrograde. In order to effect this, the Committee proposes extended right of *restitution of duty* for imports of materials and ship-building requisites used for the building, rebuilding, and repairing of vessels of over 40 tons. — Further, it is proposed, by the aid of a State grant, to build, in the first place at Stockholm and Malmö, and afterwards at some other place north of Stockholm, *docks* of such dimensions that big modern vessels can be taken into them; and finally, that also here *traveling support* be given to persons desiring to study ship-building in foreign countries.

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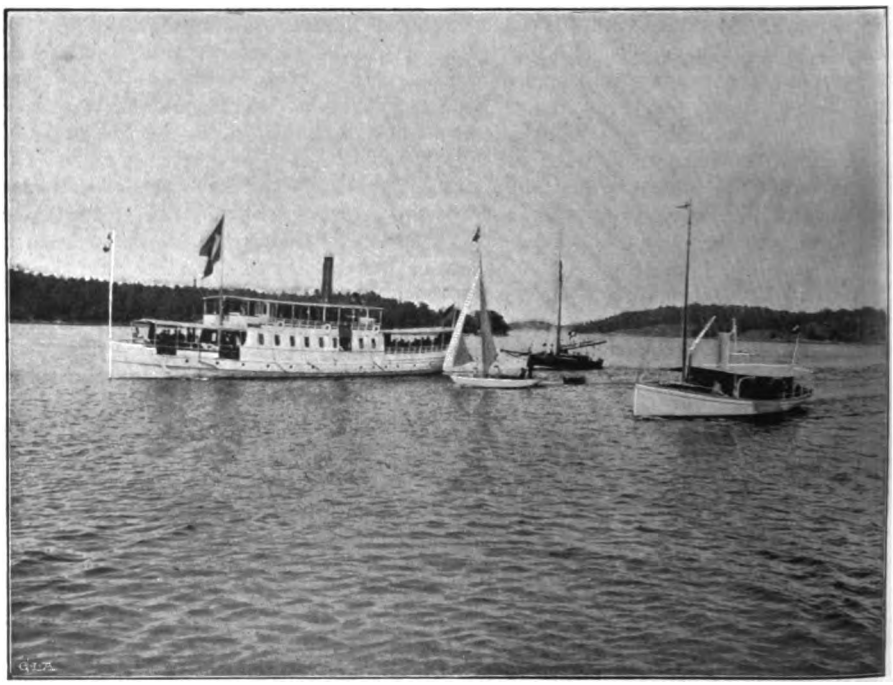
Also in **navigation legislation,** several changes were proposed, with a view, among other things, to see that no unsuitable basis be used for determining the navigation fees and that in general the ship-holder's business may not be burdened with too high fees.

Several of these proposals are in preparation by the respective authorities. Yet, some of them have already caused alterations in the legislation. As early as 1901, the Riksdag approved a new law admitting of *mortgage on vessels;* the proposed maritime mortgage bank, however, was not realized, but instead of it the above mentioned *Loan Fund* of 5 million kronor was granted (since 1904). Concerning the navigation fees, an abatement is made, inasmuch as the *Consulate fees* (see p. 971) have been abolished (since 1904).

Home Navigation.

The home navigation of Sweden has long been arranged in a simply model way. The very lively communication between the different parts of the country is kept up by several hundred steamers; and for the local traffic in our large archipelagoes, as well as for the fisheries, types of peculiarly Swedish sailing boats have developed, some of which may here deserve special mention.



In the Archipelago (Skärgård) of Stockholm.

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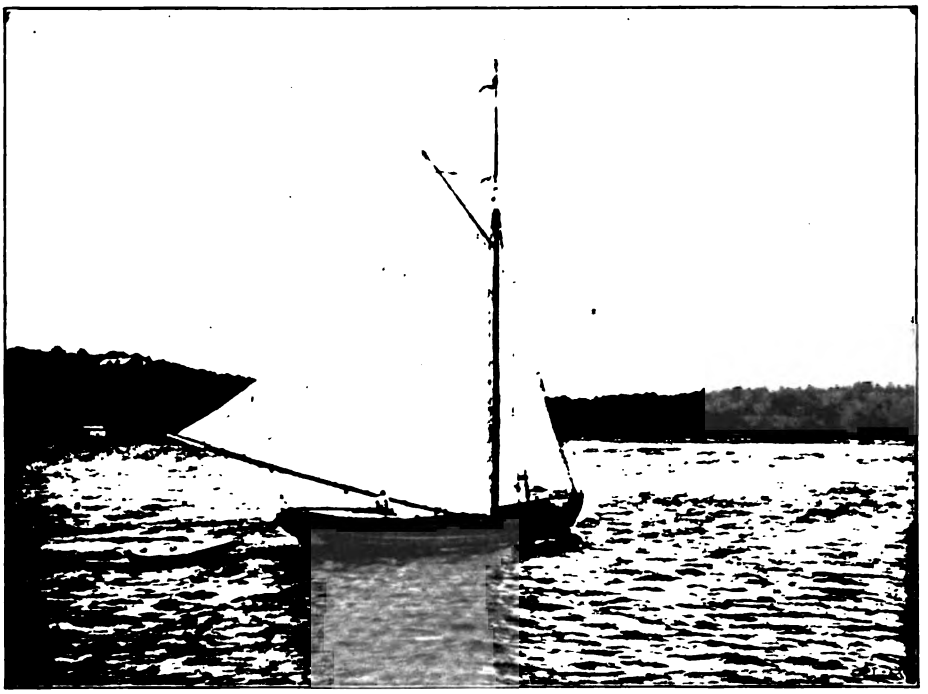
Also the Swedish **coast-steamer** early developed into a type which is very characteristic for our country.

The Swedish coast-steamer is in general a vessel of medium size, about 60 meters (200 feet) in length. Very elegant in appearance, it almost resembles a »pleasure yacht»; it is extremely well kept: painted, cleaned, and polished up at very frequent intervals. The fitting-up affords every comfort: the saloons are cosy, carpeted, well lighted and ventilated; the cabins are furnished with comfortable berths, and with large and soft sofas (hardly ever with sleeping-berths placed above each other, as is so often the case on the steamers of other countries). The attendants are exclusively female, and also the restaurant, which is at the same time excellent and inexpensive, is usually conducted by women. This perfect cheerfulness and comfort in everything, together with traveling through sceneries of peculiar beauty, without any rolling of the sea and consequently without sea-sickness, make the voyages with our archipelago- and canal steamers a real recreation, which circumstance also of later times has commenced to receive increasing attention on the part of tourists from foreign countries.

Of the Swedish **boat-types** for sailing the most noteworthy are the Koster boat, the Roslag sloop, and the Bleking punt.



Roslag sloop.

The Koster boat, which has received its name from the Koster islands on the coast of Bohuslän, is a particulary happy combination of a good and safe fishing vessel, being able to take a considerable cargo, and of a good sailer, braving with success the notorious gales of the Skagerrack. The Koster boat is decked, very strongly built, and furnished with two sails, fore-sail and storm-sail. This type is the one generally used in the pilot service.

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The Roslag sloop, deriving its origin from the 17th century, is entirely open and furnished with one large sail, fixed to a boom, in about the same manner as the mizzen-sail of a schooner — as also with a fore-sail. The construction is particularly elegant, although somewhat heavy in shape. This type derives its name from the Roslagen, or the coast immediately north of Stockholm.

The Bleking punt belongs primarily, as indicated by its name, to the province of Blekinge. This boat is capacious and light, a good cruiser, and easy to manœuvre, and possesses a great capacity of running before the wind. It is also used in fishing in the open sea, in which case it has only one, very large square-sail; otherwise it has, besides main-sail, at least also a fore-sail.

The entire **home navigation** in our country in 1901 — not including vessels of less than ten tons nor yet traffic within the respective ports — comprised vessels entered and cleared to a number of 212,409, with a total tonnage of 21,856,290 tons. Of these, 148,608 were steamers with a total tonnage of 18,405,999 tons; the steamers thus represent 67·8 % of the number and no less than 85·1 % of the tonnage. — Concerning the traffic on our *canals* some accounts are given below.

As a rule, the home navigation is the privilege of the *national* flag. In Sweden, however, the *Norwegian* vessels enjoy the same rights as the Swedish, and some other nations have here, according to treaties, the right of carrying on coast traffic.

Canals.

In Sweden, the *natural* water-ways have had a decided influence on the cultivation and colonization of the country since more remote times than history can tell about. The rivers and the lakes were the principal transport-routes. The row-boat was pulled past the falls on the journey up. Going down one often went in the rapid. In Norrland we still can see the state of things formerly predominant all over the country.

In Sweden attention was attracted to the value of *artificial* water-ways earlier than in most other European countries.

Engelbrekt, the great patriot (see p. 76), already commenced to build a canal between Lake Mälaren and the Baltic at Södertelge, though circumstances prevented him from completing the work. King Gustavus Vasa (1523/60) in this respect, as in so many others, manifested his open look into the future. Nearly all the large canals, now completed or proposed, were projected by him, and negotiations for their execution commenced, though these fairways, according to plans then proposed, would have been of comparatively modest dimensions. Between Lake Venern and the Kattegat along the River Götaelf, between the lakes Venern and Vettern, and further between the Vettern and the Baltic along the River Motala-ström, he proposed opening canals. But also between the lakes Venern and Hjelmaren, between the Vettern and the Hjelmaren, and between the Hjelmaren and the Mälaren, canal works were thought of. However, there were no means for the execution of these plans.

Charles IX in 1596/1610 accomplished a construction of canals between the Lakes Mälaren and **Hjelmaren.** But as the canal-locks were made of wood, they soon fell into decay, so that already about 1620, Gustavus Adolphus commenced to build a new canal between the Hjelmaren and the River Arbogaån, which

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was completed in 1640. When considering how undeveloped were the conditions of the time, how both capacity and willingness to work were lacking, and how there was no home-experience in this sort of work, one will feel obliged to admire the determination with which these enterprises were undertaken, and the perseverance and strength with which they were pursued to the end, in spite of all reverses and difficulties of both economical and political kind. Builders from Holland were called in, but strangers as they were to the natural conditions of our country and the materials that must be used here, they were obliged to adapt themselves to the circumstances; at the same time absolutely unpractised workmen had to be used. Under such circumstances, it is no wonder that the work was not up to the standard.

Lock at the Trollhättan Canal.

The new Hjelmare Canal had also to be thoroughly repaired only after a couple of years. After thirty years of work, this reparation was finished, but already fourteen years later (1686), the canal was again in a very bad state and had to be rebuilt (1691/1701). This work was done more carefully than before, but as yet knowledge and experience were not quite sufficient. Already in 1740 a thorough reparation proved necessary. The canal was with difficulty kept open till 1770, when a complete reconstruction had to be done, which was accomplished in 1776. The structure was improved, but remained unsatisfactory, and already in 1814 it proved difficult to keep the canal open. Taking advantage of the experience, gained when building the Göta Canal, a reconstruction was finally commenced in 1819 and accomplished in 1829, that put the canal in the comparatively lasting state in which it is now. This little history shows what difficulties canal-building had to fight against, before, after centuries of efforts, full insight in the most suitable methods was gained.

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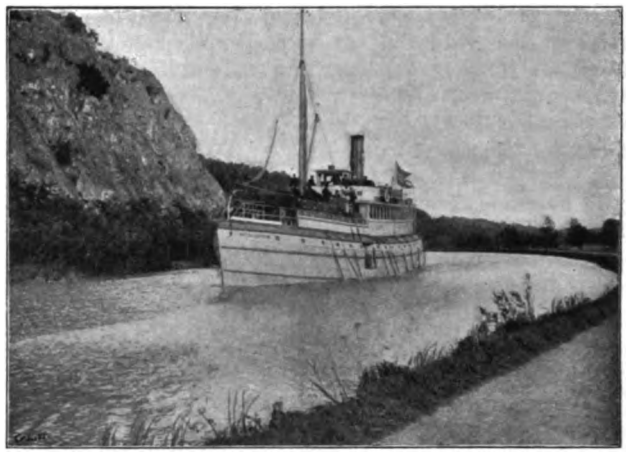

The Göta Canal, at Söderköping. Photo. ARVID LINDHAGEN.

It is principally through the building of the Trollhätte and the Göta canals that the technics in this respect have been developed in Sweden. At **Trollhättan**, *Polhem* in 1718 commenced the execution of his ingenious plan of a canal past the falls, but the work was suspended owing to the death of Charles XII. Recommenced about 1748, it was once more suspended on account of a mishap, which shook the confidence in the enterprise. The first practicable canal-lock way past the Trollhättan Falls was built in 1795/1800 by *Nordewall*, and is likely to hold out a long time yet. The entire canal in its present state dates from 1838/44.

The Göta Canal was built during the years 1810/32. It unites the Baltic, at the bay of Slätbaken, with the lakes Vettern and Venern, and consequently, together with the Trollhätte Canal, mediates the communication between the east and west coasts of the kingdom. The thought of such a canal can be brought as far back as to Bishop Brask, in the 16th century. The honour of having carried through the enterprise belongs to *Baltzar von Platen*. The whole undertaking did not cost fully 16 million kronor, which favourable result partly is explained by the fact that considerable troop-commands were employed in the execution of the work.

TABLE 148. *Canals and canalized water-systems of Sweden.*[5]

Canals.	Year of construction.	Cost of construction.[2] Kronor.	Length. Kilometers. Total.	Length. Kilometers. Artificial.	Depth.[3] Meters.	Bottom-width. Meters.	Canal-locks. Number.	Canal-locks. Length. Meters.	Canal-locks. Width. Meters.	Canal-locks. Depth. Meters.
Trollhätte	1838/44	4,500,000	81·5	8·0	3·0	11·9	16	35·6	7·1	3·0
Göta	1810/32	15,600,000	201·5	87·4	3·0	14·3	58	35·6	7·1	3·0
Södertelge	1806/19	826,100	2·6	1·9	3·6	11·9	1	41·4	8·6	3·6
Hjelmare	1819/30	1,400,000	64·1	8·5	2·2	10·7	9	35·6	7·1	2·1
Örebro	1887/88	539,000	2·0	2·0	2·2	10·7	1	37·2	7·4	2·7
Eskilstuna[1]	1855,60	227,250	10·7	1·8	2·4	7·7	3	41·6	7·1	2·5
Strömsholm	1842/60	4,257,260	100·5	14·4	1·5	9·5	31	20·8	5·3	1·5
Dalsland	1865/69	1,449,265	253·9	7·9	1·5	4·6	28	20·7	4·2	1·8
Snäcke	1872/74	43,860	17·4	0·1	2·1	4·2	1	20·7	4·2	2·1
Kinda	1865/71	1,293,820	80·2	26·9	1·5	5·4	15	29·1	4·9	1·5
Seffle	1866/70	371,000	90·9	12·8	2·1	7·7	1	37·1	7·8	3·0
StockholmLock	1845/50	1,106,265	0·1	0·1	3·6	9·5	1	45·1	9·5	3·6
Other[4]	—	918,050	224·5	13·3	—	—	16	—	—	—
Total	—	32,531,870	1,129·9	185·1	—	—	181	—	—	—

[1] Two canals (the Lower and the Upper). — [2] Figures are wanting for 3 canals (among the »Other»). — [3] Under the lowest water-level. — [4] At a number of 9. — [5] A meter = 3·281 feet. A kilometer = 0·621 mile A krona = 1·10 shilling or 0·268 dollar.

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Of our **other canals**, the *Dalsland Canal* is interesting at the point of view of technical execution (the famous »Aqueduct» at Håfverud, where the canal is brought across the stream in a steel-duct). — A survey of our canal-buildings, with the most important dates concerning their dimensions, etc., is given by Table 148, and concerning the size of the traffic by Table 149.

Of the hitherto accomplished canals, only four are intended to directly facilitate navigation between Sweden and foreign ports; these are the Trollhätte Canal, the Göta Canal, the Södertelge Canal, and the Canal-lock of Stockholm. At the time of their building the Swedish merchant fleet consisted of such vessels that nearly all of them could pass the canals. But just at this time steam began to be used as a motive power and iron as a building-material. The vessels now got quite different forms and dimensions, and it did not last long till those vessels which could pass our canals, were found unfit to compete in trading with the new vessels. Of the above mentioned canals, none therefore, but the canal-lock of Stockholm, has mediated any direct traffic worth mentioning between foreign countries and inland ports. Between Vermland ports and foreign countries some traffic has occurred, but this has rather shown the inexpediency of the vessels used. Still it has been sufficient to prove the great advantage that might be gained for the country, if ocean-going vessels could visit our inner harbours.

Besides for direct traffic with foreign countries, the Göta Canal was, however, intended to serve the transit-traffic between the Baltic and the North Sea. Such traffic has also been carefully planned and attempted, but the dimensions of the vessels are not sufficient for it. The purpose of our canals has therefore been reduced to the

TABLE 149. *Canal traffic, in 1901.*[1]

Canals.	Passing Vessels, Lighters, and Floats.	Steamers.		Lighters.		Smaller sailing Vessels.	Lighters.	Floats of Timber.	Canal fees.
		Number.	Tonnage.	Number.	Tonnage.				Kronor.
Dalsland	9,033	3,823	110,499	319	10,262	290	1,256	3,345	81,063
Eskilstuna lower	1,170	662	34,610	31	1,030	202	275	—	12,461
Eskilstuna upper	519	352	28,704	4	122	—	163	—	4,371
Göta	5,005	1,434	144,018	1,621	96,412	366	1,537	47	218,675
Hjelmare	1,358	681	40,716	65	2,397	3	608	1	34,299
Kinda	3,507	2,096	63,914	58	1,544	107	1,174	72	38,343
Seffle	2,037	1,618	139,493	191	7,197	2	218	8	52,434
Stockholm Lock	15,052	4,660	223,241	2,108	106,280	515	7,506	263	55,430
Strömsholm	3,090	671	13,726	458	13,970	—	1,836	125	34,533
Södertelge	6,214	2,582	291,701	1,224	61,474	458	1,154	796	56,365
Trollhätte	9,320	6,493	639,313	1,342	77,672	32	1,211	242	484,201
Väddö [2]	455	80	5,983	181	10,284	129	62	3	1,059
Örebro	2,059	1,470	55,982	106	2.491	149	334	—	17,803
Other	34,837	20,107	345,717	2.507	88,549	6,082	5,749	392	31,490
Total	**93,656**	**46,729**	**2,137,617**	**10,215**	**479,684**	**8,335**	**23,083**	**5,294**	**1,122,527**

[1] Concerning the tonnage, it is to be remarked that this is not indicated for the smallest vessels. — [2] The traffic was carried on, during that year, only 4½ months.

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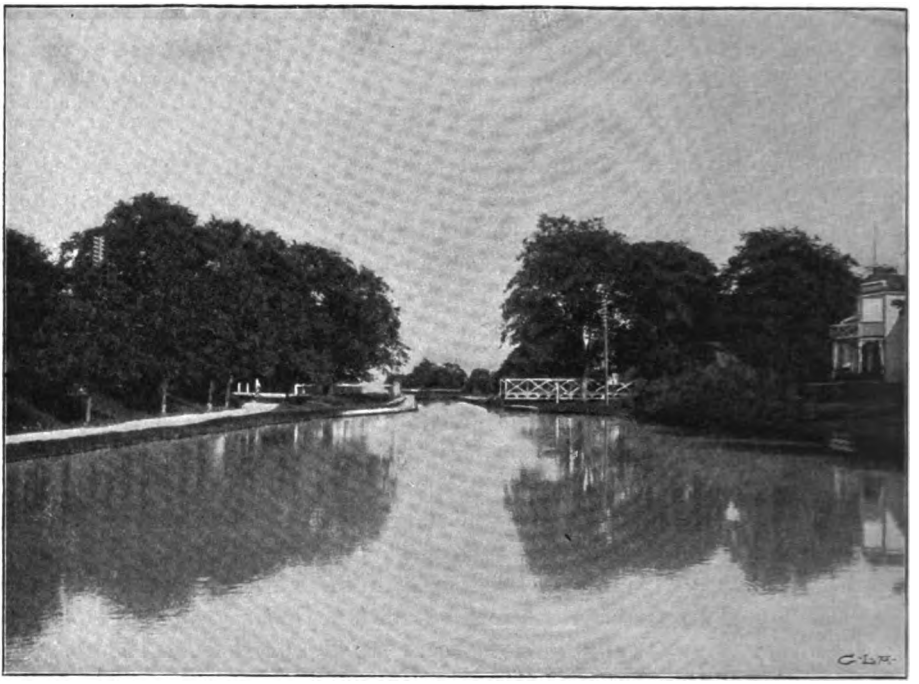

The Göta Canal, at Berg in Östergötland.

facilitating of mercantile connection between different places in the country itself.

When the era of railways began, the interest for canal constructions fell into oblivion in all countries. But the last few years have brought a great change. The strongly forced competition everywhere compels a reduction of the costs of freight, and rapidly a *distribution of work* has established itself between railways and waterways, inasmuch as the transport of heavy goods which don't need speedy despatch, has been transferred to the latter; concerning such, the freight is decidedly more favourable for transport by water. And herewith a new era has dawned for canal-building, and gigantic enterprises in this respect are in several countries already completed, while still more are being planned or prepared.

In Sweden too an experience of the superior cheapness of waterways for heavy goods has made itself felt and led to the same result as everywhere else. Also in our country attention has been roused to new constructions of canals on a large scale. A scheme for an improved canal between lake Venern and the Kattegat is already worked out and presented to the Government.

On these new canals one has, however, far greater pretensions than in earlier times. They are required to be navigable for ocean-going vessels, and the canal-journey must be effected with the greatest speed

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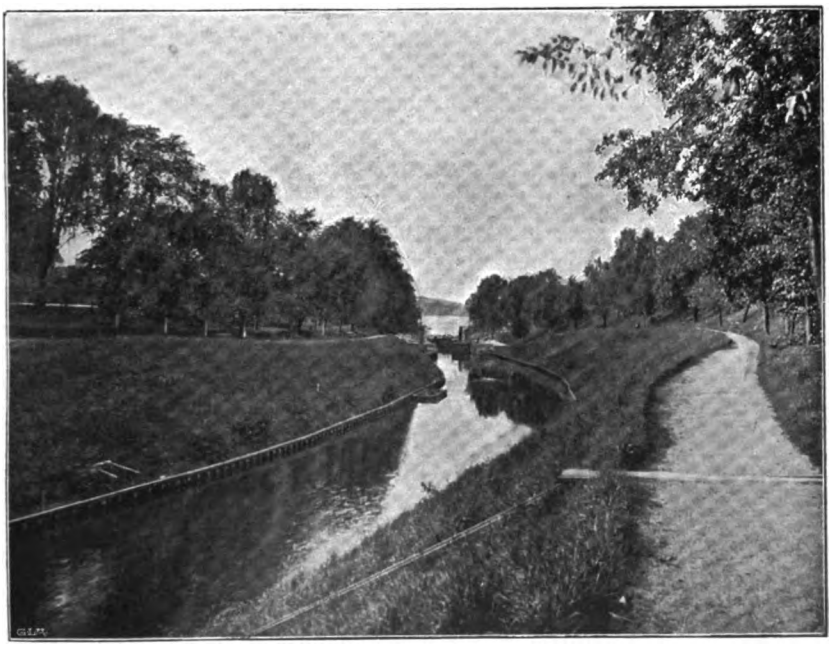
possible. With regard to technics, there is nowadays nothing to prevent the satisfying the new demands, but naturally the costs of construction will be highly increased.

In the existing Trollhätte Canal, built about sixty years ago, the number of canal-locks is 16, the length of the vessels 31·5 meters, their beam 7 meters, their deepdrawing 3 meters, and their displacement 250 tons. The time required to pass the canal-locks in this canal is at best 3 hours. For the now projected canal, 6 canal-locks are proposed. The largest vessels that will be able to pass it have a length of 110 meters, a beam of 14·5 meters, a deepdrawing of 6 meters, and a displacement of 5,000 tons. Vessels of moderate dimensions ought to be able to pass all the canal-locks in about an hour's time.

The roused interest for improved canals also shows itself in the Government bill to the Riksdag in 1900, when a vote of credit was asked for towards the investigation of new canal-routes of great dimensions from the Venern via the Vettern to the Baltic, from the Venern via the Hjelmaren to the Mälaren, besides several shorter canal-lines. By means of such canals, constructed with about the same dimensions as those intended for the Trollhätte Canal, direct traffic between inland ports and foreign countries as well as transit-traffic between the Baltic and the North Sea could be advantageously arranged. It is to be hoped that, during the new era which has now begun for canal-building, Sweden may maintain, within this domain, the prominent position it occupied already long ago.



The Södertelge Canal. Photo. K. SIDENBLADH J:R.

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Harbours and Docks.

By **Harbours** we mean, not only such inlets from the sea and the large lakes as have good road-steads and afford protection against sea and wind and fittings for the ships, but also those which afford an artificially made one, where such a natural protection is wanting. Characteristic for our Swedish harbours is their never being tided.

Of natural harbours there is in our country a well-nigh countless number, many of them being provided with quays for the mooring of vessels and for loading and unloading of goods. The number of harbours artificially made, is comparatively small. The most important of them are those of Halmstad, Helsingborg, Ystad, Kalmar, Visby, and Malmö, where a new, very considerable harbour just was inaugurated in 1903. — In 1901, *dues* were received at 225 harbours to a total amount of 1,811,159 kronor. The largest amounts were presented by the harbour of Gothenburg with 290,293 kronor, that of Stockholm with 220,031, and that of Malmö with 118,129 kronor.

Docks are to be found in Gothenburg, Malmö, Oskarshamn, Norrköping, Stockholm, and several other places. Besides, there are for the use of the Navy one dock in Stockholm, and six in Karlskrona; at the last mentioned place, there is besides a new one in course of construction. An idea of the dimensions of our docks will be gained by Table 150 below.

Larger **Slips** for vessels are to be found in Gothenburg, Malmö, Karlskrona, Gefle, and Stockholm. At Finnboda and Långholmen (both in Stockholm), vessels of 119 meters in length can be hauled up, at Brynäs in Gefle, vessels of 118 meters, and at Bomhusvarfvet (also in Gefle), vessels of 100 meters. The largest tonnage — 1,700 tons — can be received by the Malmö slip.

TABLE 150. *Survey of the dimensions of the Docks.*[9]

Docks.	Depth.[1] Meters.	Width.[2] Meters.	Length.[3] Meters.	Docks.	Depth.[1] Meters.	Width.[2] Meters.	Length.[3] Meters.
Lindholmen[4] ...	5·94	14·85	64·13	Söderköping[7]...	2·97	7·13	.
Helsingborg	4·75	11·88	81·95	Motala[7].....	2·97	7·13	.
Malmö[5]	3·71	10·39	64·13	Sjötorp[7].....	2·97	7·13	.
Limhamn.....	1·78	8·31	35·63	Norrköping	2·97	10·64	71·26
Sölvesborg.....	4·45	17·81	89·67	Galervarfvet[8] ..	3·56	17·81	89·07
Karlskrona[6]	6·11	19·00	70·00	Beckholmen[8] ...	5.34	16·63	100·06
Oskarshamn.....	4·45	13·66	87·69	D:o[8] ...	3·56	10·69	97·98
D:o	2·38	14·92	48·10	Södra Varfvet[8].	6·00	19·00	72·00

The dimensions of the new docks proposed (see p. 951) are: length 150 meters, width of the dock-gate 20 meters, and depth on the apron 7 meters.

[1] On the apron. — [2] In the gate of the dock. — [3] Between wind and water. — [4] At Gothenburg. — [5] By using caissoons, vessels 71·26 meters in length, can be taken in. — [6] The dimensions put down are maxima for the six docks in Karlskrona. Minima are: depth 5·3 meters, width 15·32 meters, and length 63·13 meters. — [7] At the Göta Canal. The dock holds 6 to 10 vessels. — [8] In Stockholm. The dock at Södra Varfvet is a floating one. It can take vessels of 2,000 to 2,500 tons. — [9] A meter = 3·281 feet.

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Pilots and Lighthouses. Maritime Life-Saving Establishments.

In Sweden, Pilots and Lighthouses, as well as the Institutions for succouring the shipwrecked, form together the *Pilot Service* (Lotsverket), under the Pilotage Board (Lotsstyrelsen).

As early as the middle of the 16th century, there existed ordinances enacting that whoever, after undertaking the duties of a pilot, ran the ship aground, should incur the penalty of death, unless such grounding were caused by a high sea or violent stress of weather. The *Pilot Service*, as a State institution, dates back to the times of Charles XI (1660/97). In 1655, Pilots of the Crown had allotted to them certain farms out of the Crown domains; these farms were exempt from all taxation, on condition that the owners undertook to give preference in piloting to ships of the Crown. As the navy increased, piloting developed. In 1687, a Director of the Pilotage was appointed. In 1774, compulsory pilotage was introduced, all ships coming in from the open sea being thereby obliged to employ one of the Crown pilots. Beacons and other sea-marks were in use as far back as the Middle Ages, but during the reign of Gustavus Vasa, in 1550, the peasants residing on the coast and adjacent islands were enjoined to beacon all reefs, shoals, or shallows with broom-beacons, both within the fringe of islets and rocks (the »Skärgård») and out at sea. At the present day, the waterways and channels are beaconed in such a way that, on one side, there are beacons painted red and surmounted by a broom (Ruskprickar), and, on the other side, beacons consisting of a stake or pile painted black and white, plain-beacons (Slätprickar).

With respect to *Lighthouses*, it may be remarked that the Kullen Light, in Skåne, is the oldest, having been erected as early as 1560 (consequently during the period when that province was a Danish possession). However, it is only since 1800 that the development of lighthouses has been rapid. The first light-ship was stationed on the Falsterboref, in Skåne, in 1844.

The Life-saving organization dates from the end of the 17th century, but was at that time entrusted to private persons. It was not until 1855 that the first Life-saving Station supported by the State, was established; since then, however, life saving facilities have developed with tolerable rapidity.

Sailing Directions for the Baltic Sea were published in 1644 by one Captain *Johan Månsson*, of the Admiralty, who also published a kind of chart of the Baltic. A better one was issued in 1694 by Captain *Gädda*, but the formation of a Nautical Charts' Office (Sjökarteverket) was not commenced until 1737. At present, there are excellent charts extant of the coasts of the kingdom. A fuller account of this will be found under the heading Official Maps.

The Pilotage Board (Lotsstyrelsen), the functions of which are regulated by instructions of October 14, 1898, includes a president, with the title of Director General (Generallotsdirektör), and three other members, of whom one superintends the Secretary's Department (Kanslibyrån), and another the Pilot Branch, the third being Chief Engineer (Öfverfyringeniör) and presiding over the Lighthouse-Engineering Office. The officer at the head of the Pilot Branch is only appointed for a limited term of years. — The regular staff of the Pilotage Board, in 1902, numbered 20 persons.

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TABLE 151. *Pilot and Lighthouse service, in 1871/1902.*

Average for the years	Pilotages.	Pilotage fees. Kronor.	Expenditures of the Pilot service.[1] Kronor.	Wrecks.[2]	At the end of the period.				
					Pilot stations.	Lighthouses.	Pilot staff.[3]	Lighthouse staff.[3]	Value of boats, lighthouses, etc.[4] Kronor.
1871/75.....	50,234	631,830	970,793	182	152	79	963	241	5,432,215
1876/80.....	45,486	717,425	1,093,609	183	144	85	856	235	6,133,491
1881/85.....	31,234	635,641	1,331,120	224	136	191	759	341	7,538,041
1886/90.....	27,647	600,168	1,343,578	192	135	241	780	361	8,429,081
1891/95.....	34,117	731,695	1,578,355	203	134	283	875	482	9,620,490
1896/00.....	43,846	933,390	1,710,247	205	131	312	939	414	10,310,215
In 1902.....	44,898	1,043,499	1,664,294	273	129	304	928	385	10,915,950

The Pilot Service (Lotsverket) as now constituted, was organized in 1881. The coasts of the kingdom and adjacent waters are divided into eight *Pilot Districts*, bearing the names of the towns in which the head of each district (with the title of Pilot Captain, Lotskapten) resides, viz.: Luleå, Sundsvall, Stockholm, Visby, Norrköping, Kalmar, Malmö, and Gothenburg. As a rule, a Pilot Captain is selected, either from among the officers of the Royal Navy, or from among the Pilot Lieutenants (Lotslöjtnant), of whom there is one in each district, acting as second officer to the captain in command and as his deputy. The Pilot Lieutenants are also, as a rule, selected from among the officers of the Royal Navy, either in active service or in the reserve.

The non-commissioned officers and the staff of a Pilot District comprise, specially for the pilot Service: Chief Pilots (Öfverlots) at some of the more important stations, Pilot Superintendents (Lotsförman) at the other stations; besides, the requisite number of pilots, in three classes: Master Pilots, Pilots, and Pilot Apprentices (Mästerlots, Lots, and Lotslärling); further for the lighthouse service: Lighthouse Masters, Lighthouse Keepers, and Lighthouse Servants (Fyrmästare, Fyrvaktare, and Fyrbiträde); finally, at the life-saving stations: Masters (Uppsyningsman), Coxswains (Båtstyrare), and Rowers (Roddare).

All persons holding fixed appointments and drawing pay under the Pilotage Service are liable to serve in the Royal Navy (upon order of the Government) in case of war or more important occasions of naval armament. The Director General of the Pilot Service, together with the body of Officers and men employed in the Pilot Districts, are under military law.

The Pilots must be thoroughly familiar with the water-ways and all shallows in the neighbourhood of their stations, even when all beacons and sea-marks are wanting; it devolves upon them to place beacons and other sailing-marks in position immediately after the break-

[1] Including the expenditure for the Life-saving establishments. — [2] On the coasts of Sweden. — [3] Including the staff common to the Pilot and Lighthouse services (33 in 1902). — [4] The value of the boats owned by the private individuals of the staff not included.

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ing up of the ice in spring; see that vessels arriving from abroad only enter by the officially authorized channels, and that they call at the proper customs stations; they have further to provide the seafaring public with any pilotage required, etc. The pilots in general are in receipt of no fixed wages, their principal source of income consisting in the pilotage dues that they obtain from the navigators whom they serve. However, at stations where only trifling or insufficient earnings in pilotage are obtainable, the pilots generally receive a definite remuneration, varying between 60 and 600 kronor (à 1·10 sh. or 0·268 dollar). The total of the pilotage dues obtained at each place is divided among the pilots at the end of every month, generally in equal parts, called *pilot-shares* (lotslotter). These vary extremely. Thus, the largest pilot-share in 1902 amounted to 4,585 kronor, while the smallest was only 33 kronor. The former was obtained by each pilot at the great iron ore exporting harbour of Oxelösund, the latter by each man at a small pilot-station on the coast of Gotland.

The Lighthouse Staff have to see to the lights and, as regards large sea-lights, to make sure that they burn from sunset to sunrise, as long as navigation within the range of their light is not impeded by solid icefields; they have also to attend to fog-signaling when necessary. At the small lights along channels between the islets that border the coast, there is no permanent attendance; they are generally, however, looked after once a week and burn continuously day and night. As regards them, there are special instructions about times of lighting. The attendants at lighthouses have permanent appointments under the State.

The Lightships on the east coast of Sweden are placed in position as early in spring as feasible, without too great a risk being incurred from drifting ice; they are taken in towards the end of the year, as soon as any possibility of their being frozen in is to be apprehended. But on the south and west coasts of the kingdom, on the other hand, the lightships are sometimes left at their stations all through the year. The value of the 21 lightships in 1902 was estimated at 2,100,000 kronor.

Life-Saving Establishments. The number of persons employed at these stations in 1902 was 154 (inclusive of 23 men who also belonged to the pilot and lighthouse services). Their duties consist in endeavouring to save shipwrecked or distressed crews. They receive payment for each salvage operation.

Statistics. The Pilot Service, in its entirety, is exclusively supported by the *lighthouse and beaconage-dues* (Fyr- och båkmedlen), i. e., the fee paid by vessels leaving for or arriving from abroad. This charge is at present 25 öre (3·3 *d.*) per ton, and for certain voyages, by bill of tonnage; it yielded in 1902 the gross sum of 1,750,043 kronor. The number of *pilot fairways* is 2,077, and that of *beacons*, *balizes*, etc., 4,959. — The number of vessels that ran *aground* in 1902, with a Crown pilot on board, was 41, but in only one of these

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cases did the Military Court, having to enquire into the circumstances, sentence the pilot as being guilty of the mishap. — Concerning the development of the Pilot and Lighthouse Services, from 1871 onwards, statistics will be found in Table 151, page 962.

At the 18 *Life-saving Stations* in the kingdom 7 persons were saved in 1902, and since they were started, a total of altogether 1,661 persons have been rescued.

The Pilot Service entirely or partially supports no less than 25 *Schools* in remote localities, and instruction was there given, during 1902, to 271 children.

Sweden has always occupied a proud position in the domain of lighthouse technics and inventions. We will only mention here that the first *revolving light* provided with a mirror-reflector (holophote), was erected at Marstrand in Sweden. and name such Swedish inventions as: the *von Otter* system of lighting certain sectors where shoals exist with varying intermittent lights (Klippsken); the *Lindberg* system of producing intermittent lights by the use of automatic rotators, which can be employed for small lights not constantly watched — a system now applied at inshore channels nearly all over the world; and also a lamp of special construction used in these lights, giving continuous illumination by the aid of petroleum, etc.

Salvage and Diving Work.

In the decade 1671/80 diving-operations for the salvage of the cargoes of shipswrecked vessels are for the first time recorded in Sweden. At that date, a foreigner, F. A. von Treuleben by name, obtained a license from the Crown to carry on regular diving and salvage work. Later on (in 1692 and 1729 respectively), two Diving-Companies were formed, and their licenses were renewed from time to time. These two companies succeeded in existing side by side until 1802, when an alteration was effected, inasmuch as one single Diving and Salvage Company was then founded to embrace the whole kingdom. That company continued till the summer of 1831, but during the later years of its existence, it was subjected to various restrictions in its monopoly. In the thirties of last century, an attempt was again made to form a privileged association, and a charter was granted to it, but salvage work shortly afterwards fell into the hands of private speculators.

The credit of having introduced a systematic organization into salvage work is chiefly due to Consul *E. Liljewalch*, who, in 1869, founded the **Neptune Salvage Co.,** which is now well known all over the world. The operations of the company are by no means restricted to Sweden, for they have extended to many remote parts of the old world. Nor have offers of salvage business from America been wanting, although the company has not hitherto had the opportunity of availing itself of them.

The principal salvage *appliances* in the possession of the Company at present consist of: 11 salvage steamers, 8 fixed centrifugal pumps, 22 portable steam pumps, 2 centrifugal pumps worked by electricity 6 large steam-airpumps, 25 complete diving-apparatuses, 4 cylindrical iron pontoons, 2 prismatic iron pontoons, 4 timber pontoons, 1,800 fathoms of nine-inch steel cable, 200 fathoms of »Galle's chain», 100 fathoms of chain-cable, 42 hydraulic jacks, and a number of sea-going hulks fitted with steam cranes, sea-going lighters provided with lifting-cranes, submarine blasting appliances and rock-drilling machines, and various blocks, jiggers, etc.

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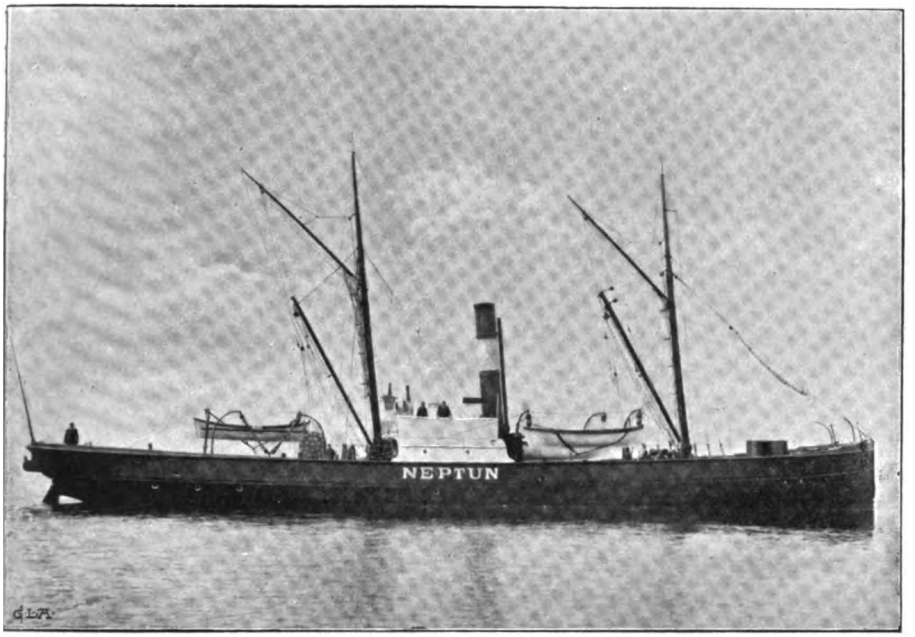

The Salvage-Steamer the Neptune.

Since its formation, the company has *saved:* 4 iron-clads, 1 torpedo-boat, 101 large steamers, 127 coasting and passenger steamers, 448 sailing vessels, 5 dredging machines, 1 lightship, 1 pilot steamer and 1 pontondock and 881 miscellaneous, cargoes, rigging, etc., or in all 1,989 successful salvage operations, the goods thus saved representing, in their damaged condition after salvage, a total value of 131,539,000 kronor. Among the above operations the following may be specially mentioned: the English steamer the »Easington», in 1899, in the neighbourhood of Constantinople; the English steamer the »Coningsby», in 1890, near Cape Finisterre; the German emigrant steamer the »Eider», in 1892, off the coast of the Isle of Wight, in the British Channel (a particularly fine performance); H. M. S. the »Howe», a British iron-clad, in 1893, off Ferrol, an achievement that gained the Company a worldwide celebrity, and obtained for them and their employees superlative praise from the British Admiralty. The salvage of the English steamers the »Willysike» in 1898, off the Canary Islands, and the »China», in the same year, in the Red Sea, were also very notable performances.

During recent years efforts have been made in Sweden to find a means of working at a greater depth than formerly, when 30 meters was the deepest to which a diver could descend. Deserving of special notice here is the *Waller Tube*, a diving-apparatus constructed in 1895 by a Swedish engineer P. A. Waller. It consists of a sheet-iron tube in several sections fastened together; towards the bottom it widens out so as there to form a fairly roomy compartment for working in, the instrumental equipment of which is of ingenious construction. Passing through the working room are, on the one hand, vertical iron bars, which are movable up and down through hermetically closed apertures and capable of being turned into various positions from inside the chamber, and, on the other, instruments that are made to project horizontally by means of wall-bearings and which can be moved in and out through the walls of the tube from inside and can be

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twisted and directed towards different points. The vertical bars are fitted at their lower extremities with hooks, so that they can be thrust down to grapple under the object to be raised. At their upper ends they are furnished with chain couplings and connected with windlasses or cranes above water. The instruments that work horizontally through the walls of the tube are intended to be used as an alternative, for which purpose there is an exterior hemispherical shutter, which can be closed hermetically or opened when necessary. By means of the Waller Tube the Swedish steamer »Södra Sverige», of about 600 tons, which foundered among the islands outside Stockholm, in September 1895, was raised between September 1896 and May 1897 from a depth of 55—56 meters (about 180 feet), or twice that from which it had previously been found possible to raise sunken vessels.

In addition to salvage-work at great depths the Waller Tube is likely to be employed in scientific investigations at the sea-bottom, there being no difficulty for a diver to descend in it to a great depth and to remain below for any length of time desired.

Navigation Schools.

The navigation schools of Sweden originate from a school for the education of mates in Stockholm, established on the strength of a Royal Letter of June 4, 1658. Their present organization is founded principally on the Royal Letter of April 7, 1841, and at present the Royal Regulation of June 6, 1890 is essentially in force. *Four complete schools*, consisting of one navigation and one engineer division, are established in Stockholm, Gothenburg, Malmö, and Hernösand; and *six, only containing a navigation division*, in Gefle, Kalmar, Karlshamn, Strömstad, Vestervik, and Visby. A navigation division consists of one class for mates and one for ship-masters, an engineer division, of one class for engineers and one for chief engineers. The schools are subordinated to the Naval Department. An inspector, nominated by the Government, superintends the appropriate course of the instruction, is present at examinations, etc. At each school, the closest supervision is excercised by a Board chosen by the town council at the respective places, and by the Government a manager is appointed, who is also head-teacher in the navigation division. The other masters and extra teachers are appointed by the Naval Department. Managers and teachers are entitled to a pension when they have attained 65 years of age, and count 35 years in office. The salaries of the teacher staff are paid by the State, but school buildings and houses for the managers are provided by the respective towns. Other expenses are defrayed by public funds and the pupils' fees.

For naval officers and ship-masters who want to legitimate themselves as managers, a *Course* is annually arranged in Stockholm for higher mathematics, astronomy, compass-instruction, tide-instruction, and nautical meteorology.

A pupil at a Navigation school shall have attained 16 years of age, a mate's apprentice shall have served at sea at least 2 years, a captain's apprentice, who is to have passed his mate's examination or have equivalent knowledge, 3 years.

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For an engineer's apprentice, at least one year's practice in the managing of a steamer engine is required and one in steam-engine work at mechanical works; for a chief-engineer's apprentice who has passed his engineer's examination, at least half a year's engineering on board a sea-going steamer. Applicants for the mates' or engineers' class shall know the four rules of arithmetic in whole numbers and fractions.

The instruction begins, for a navigation division, on the first week-day in September at four schools, after September 15 at three schools, and in October at the remaining three, for an engineer's division, also on the first week-day in September at three of the complete schools, in October at the fourth, and proceeds 6 hours every week-day — with fifteen days' recess at Christmas — up to the time for examination, which in the navigation division is held between April 20 and June 15, in the engineers' division in the latter half of March.

The instruction includes in the mates' class: arithmetic, geometry, plane trigonometry, terrestrial and astronomical navigation, and laws; in the sea-captains' class: above mentioned subjects more completely, as well as spherical trigonometry, nautical meteorology, mechanics, shipbuilding, knowledge of steam-engines, and hygiene with bandaging; in the engineers' division: arithmetic, geometry, mechanics, knowledge of steam-engines, and electricity.

The year of study 1902—1903, 98 passed their final examination as sea-captains, as mates 155, as chief engineers 71, and as engineers 95, besides which 54 ordinary and 22 private pupils passed their examination in the knowledge of steam-engines.

Maritime Legislation.

On June 12, 1667, a general Swedish maritime law was instituted. Later on, supplemented, among other things, with certain parts of the regulation for merchantship-masters and sailors of March 30, 1748, and the insurance and distress regulations of October 2, 1750, it did not lose its force till after two hundred years. The maritime law then passed, of February 23, 1864, was founded on the chief principles of the law it should replace, but was completed, according to the requirements of the time, with a utilization of the more recent legislation of foreign countries. It was followed on *June 12, 1891* by the maritime law valid now (from 1892 inclusive), which was compiled in collaboration with Norwegian and Danish delegates, and this less for want of alterations in the law of 1864 than owing to a wish for community in the maritime legislation of the Scandinavian countries. This community is also pincipally realized.

Swedish maritime legislation, at the side of the part principally or exclusively belonging to civil law and contained in the maritime law, has, moreover, found an expression in a multitude of by-laws, decreed by the administration.

A vessel is *considered Swedish* when either at least two thirds of it are owned by Swedish subjects or by Swedish and Norwegian subjects in common, or else belongs to a Swedish joint-stock company whose Board sits in Sweden, and whose share-holders are Swedish subjects.

The right to fit ships for home as well as foreign shipping accrues to any Swedish man or woman. When several persons are owners of a vessel, a *chief owner* has to be selected among them, who always must be a Swedish subject and domiciled in this country.

The owner is personally responsible with all his property for the liabilities he personally or through another person takes upon himself with respect to the

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vessel as well as for the claims of the crew, on the strength of hiring-agreements and contracts of service which the ship-master has entered into. For other claims the owner is responsible only with the vessel and cargo. When there are several owners of a vessel, each one has personal responsibility only in proportion to his share in the vessel.

Of all Swedish vessels, intended for naval commerce or the conveyance of passengers and having a tonnage of 20 register tons or more, a register is kept. *The register of Swedish vessels* has up till now been of no legal importance, as it is only in 1901 that a decision has been taken which may entail the right to mortgage on vessels. The registering is centralized in the Board of Trade. After the registering, certificates of nationality and registering are issued, which, together with a muster-roll, are the papers Swedish vessels leaving for foreign ports must carry with them to certify their nationality. — The *domicile* of the vessel is decided by the owner, who has to make an entry about it in the register.

Among the ordinances regulating the *obligations and privileges of the ship-master*, those are of special importance which place on the captain the principal care and responsibility of the sea-worthiness of the vessel. Swedish legislation namely prescribes preventive control for this purpose only for passenger- and emigrant steamers. The captain's duty in this respect refers not only to the vessel itself but also to its equipment, crew, supply of provisions, etc., the stowing of the cargo, and hereunto belonging things. During the voyage he shall do everything to keep the vessel in a sea-worthy state. Neglect in this regard entails punishment, which also devolves on the owner or any other person who, on behalf of the owner, has had anything to do with the vessel, and intentionally has seduced to such a crime or encouraged it. Under special circumstances mentioned in the maritime law, the master has to take measures for an inquiry and inspection of the vessel, to make a protest, etc.

Condemnation occurs not only when repair is impossible or the vessel cannot be sailed to a port where the reparation must take place, but also when the vessel is not worth being repaired.

A privilege of the crew, working in the direction of securing the use of *sea-worthy* vessels, is that the crew has a right to obtain dismissal if the master neglects to put the vessel in a sea-worthy state, in case it be not in such a state for the voyage it shall undertake. Moreover, it is the duty of the master to have the vessel inspected for ascertaining its sea-worthiness when more than half the crew makes this proposition, and, in case the vessel be already loaded, when the mate or the engineer joins in the proposition. If at the inspection reasonable ground is found to be lacking, those who have demanded the action shall defray all expenses and losses caused thereby. — In connection with this may be mentioned that, at the *marine declaration*, two *experts* have to assist the municipal court and that, when a vessel has been lost, abandoned, injured, or certain other cases have occurred, the court shall, in connection with the declaration, seek to produce complete *explanation* as to the causes of the accident. Abroad, the marine declaration is to be held by the Swedish—Norwegian Consuls assisted by experts or the local courts. The consul has to produce the explanation aforesaid, if not already held by the court. In Norway and Denmark the courts are liable to hold such explanation in connection with the marine declaration to Swedish vessels.

Concerning the *obligations of ship-owners towards the master and crew*, when they leave their service on account of special circumstances mentioned in the maritime law, those are regulated by the law. The bringing home of master and sailor, — Swedish and, in case of reciprocity, Norwegian, — if they have left their service in a foreign place, owing to the wreckage, condemnation, or capture of the vessel, as good prize during war, is paid by the State.

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The maritime law further regulates the *relation between freighter, charterer, and consignee* such as: closing of charter-party or agreement about the carriage of goods; agreement about lay-days or time for awaiting the receipt or delivery of the goods; the legal relation between the charterer and the consignee by means of bills of freight; raising of loans on bottomry, or loans on the mortgage of vessel, freight, or cargo. It also contains by-laws concerning distress, damage by collision, salvage-money, marine-insurance, etc. It ought to be mentioned that the so-called silent priorities, the real sea-claims, which carry with them a right to security in vessel and freight, entitle to payment before the claims of other creditors. To these sea-claims belong the captains' and the crews' claim for pay, and the time of prescription for this claim is one year from the day the service ceased. Other claims are liable to prescription within times regulated for the different kinds in the common or maritime law.

Mustering and issuing of muster-roll are obligatory when the vessel is bound for foreign port, but when it trades in Sweden, they occur only when the master or the crew desire it. The muster-roll is issued at the mustering, which, in a town where there is a Seamen's Register Office (Sjömanshus, see p. 973) takes place, before its attorney, in other towns before the Secretary of the magistracy. Partial mustering as well as paying-off is done by one of these authorities, or, in boroughs and country-ports, by the director of the customs, or, outside the Kingdom, by a Swedish-Norwegian consul.

For mustering within the Kingdom, it is required to be enlisted in a Seamen's Register Office, or to belong to the Royal Navy. It has to be observed then that the captain and mate be Swedish subjects, that they as well as the engineer be qualified, and that at least three quarters of the crew consist of Swedish and Norwegian men. In foreign ports, foreigners to the number of more than a quarter of the crew, can be shipped or mustered, and Swedes without being enlisted at a Seamen's Register Office.

The statutes set down in which cases and to what extent qualified masters and officers shall be found on a vessel. *To be qualified to command* a merchant-ship going beyond Skagen and Lindesnäs to other ports on the North Sea than a Norwegian one, or to ports on the Channel as far as Brest, or other ports in Great Britain and Ireland and there unto belonging islands close by, it is required to have a mate's certificate, to have attained 21 years of age, or to have a master's certificate. On a more extensive voyage, a master's certificate is required. To obtain such papers, it is necessary to be a Swedish or Norwegian subject and to have fulfilled certain duties with regard to navigation and proofs of knowledge. To obtain a mate's certificate, it is necessary to have attained 19 years of age, to obtain a master's certificate, 21 years. The acquiring of a master's certificate presupposes the possession of a mate's certificate.

For control of that means of conveyance itself with which maritime business is carried on, there are, as before mentioned, regulations only concerning *passenger-* and emigrant steamers. The legislation for passenger steamers has, besides, been subjected to revision by certain persons, the schemes of whom will soon be presented. Concerning *emigrant vessels* there are prescriptions to be found in an ordinance of June 4, 1884. For both these kinds of vessels inspection is required. For the security of the navigation, regulations are given in an ordinance about measures for the *avoiding of collisions*, etc., containing partly international rules acceded to by Sweden, partly special rules for the navigation in Swedish waters, and, in a proclamation concerning signal-lights on board vessels, containing detailed prescriptions of dimension, construction, and application of top-, side-, and anchor-lights. Purposing the security of navigation, rules also exist concerning the carriage on board vessels of explosive goods and dangerous oils.

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The State has, moreover, fixed the limits of activity for assistance of navigation and naval commerce exercised by *ship-brokers*, just as the State has fixed a special tax of provision for *arbitrators of averages*. In this connection should be remembered the activity purposing to aid those who carry on shipping and trading which duty devolves upon the Swedish-Norwegian *Consuls*. According to the Consular Regulation of November 4, 1886 and the instruction attached to it, the consuls have to promote the welfare of the United kingdoms to the utmost of their power, particularly with respect to commerce and shipping, and generally to aid seafarers as well as especially to see that masters of vessels enjoy their proper rights.

Through *treaties* with most of the shipping nations, Sweden has provided for its shipping a treatment, upon condition of reciprocity, due to the most favoured nations, or a national treatment, in foreign ports. Trading here in the Kingdom is nevertheless only allowed, except to Norwegian vessels which are equal with ours, to Belgian, Danish, Italian, Dutch, British, and German vessels.

Shipping Dues.

According to Swedish legislation, common dues accrue on the shipping, partly abroad on Swedish vessels, partly in Swedish ports on Swedish and foreign vessels. They are, as a rule, calculated according to the net register tonnage of the vessel. This is found out by the **Register measurement,** the result of which is entered in the Bill of tonnage (Mätbref).

Before 1874, the measurement in Sweden was founded on the weight of cargo which the vessel could carry, and a corresponding tonnage was calculated for the vessel. That year the Moorsom system, already before adopted by most of the shipping nations, was accepted here, through which the measurement was founded on the capacity of the vessel, and was its tonnage decided expressed in *register tons*. (1 reg.-ton = 2·83 cubic meters = 100 English cubic feet). The net register tonnage is found by deducting from the total tonnage the capacity of certain rooms reserved for the captain and crew, and for the propulsion, navigation and manoeuvring of the vessel. Concerning the deduction for steamers of engine-room and coal-boxes, one distinguishes between the so-called *British rule*, according to which a percentage depending upon the relation between the capacity of the engine-room and the brutto tonnage, is deducted from the latter, and the so-called *German rule*, according to which the really measured capacity of the engine-room and the coal-boxes is deducted. Most of the sea-faring nations use the British rule at the measurement of steamers. This rule was introduced, by the ordinance of 1874, in Sweden also, but already in 1880, one passed over to the German, which is still used, but with a right for the steamers to get the tonnage calculated also according to the British and Danube rules and the result thereof entered in an appendix to the aforesaid Bill of tonnage (Mätbref). Of late, several demands have been made of a return to the British rule, and the Commerce and Navigation committee, appointed in 1898 and mentioned several times before, has also recommended an attachment to this rule.

Common **dues in Swedish ports** for Swedish and foreign vessels are: lastage, pilotage, light-dues, tonnage fees to the Seamen's Register Offices, harbour-dues, and land money.

The lastage, which 1877/85 was 14 öre per ton, is from 1885, 10 öre (1·3 *d.*) per ton according to bill of tonnage. These dues are paid each time on arriving and on leaving. If a vessel makes several voyages during one civil year between Sweden and a foreign port, the dues are paid only when leaving for the first voyage, and on arriving again only when the vessel carries cargo and unloads more or less of it, whereby a vessel is considered in ballast when the cargo

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falls below a tenth of its net register tonnage. Vessel which, during voyage between foreign ports, in Swedish harbour loads or unloads goods to at most a fourth of its tonnage, is free of dues. The Commerce and Navigation committee has proposed the abolition of this due, but it has lead to no result.

The pilotage. Valid regulations are given in the proclamation of November 17, 1896, which with obligation to employ pilot unites pilotage-duty as a rule. Vessel which sails between Swedish and foreign port and passes a pilot's fairway for piloting through which the vessel during current civil year has paid pilotage ten times, if it is a steamer, and five times if it is a sailing-vessel, is released from pilotage during the remaining part of the year, if the foreign port is situated inside the line Lindesnäs—Hanstholm, but these dues are reduced to half the price if the foreign port lies beyond the aforesaid line. Vessels of 40 tons or below that are free of dues, and also steamers which make regular voyages between Swedish and Danish ports at Öresund.

The light-due, which about 1870 accrued also on vessels in home-shipping, is now paid only by vessels over 40 tons in foreign shipping. According to a proclamation of June 14, 1894, light-due shall be paid with 25 öre (3·3 *d.*) per ton of the net register tonnage for every vessel, which arrives from or leaves for foreign port, but if such due has been paid during a civil year, for steamer eight times and for sailing-vessel four times, the vessel is free from paying this due during that year.

From the above-mentioned three kinds of dues, coaling-and provisioning-vessels and vessels looking for orders are released, further vessel which owing to forcible reason touches at a port, Crown vessel, a. o.

Tonnage to the Seamen's Register Offices is made out, for vessel which from Swedish port leaves for Norway or foreign port, with 3 öre (0·4 *d.*), if the vessel is Swedish or Norwegian or belonging to a foreign nation in the ports of which Swedish vessels enjoy national treatment, but otherwise with 5 öre (0·7 *d.*), — all per ton according to Swedish or equal foreign bill of tonnage. If a vessel leaves a Swedish port several times during a calendar month, the due is paid only once a month.

Harbour dues are paid for vessels and goods according to special taxes confirmed by the Government on the advice of the authorities with the application of certain principal rules, and with a validity of five years.

Land money is paid for vessel which makes use of institutions for shipping at certain sufferance-wharfs, principally in Norrland, after that the owners have obtained the permission of the Government to receive dues according to a fixed rate. These dues are generally reduced to half for vessels which at the place unload or load capacity not exceeding half the burden of the vessel.

The dues for the register measurement in Sweden at present, as a rule, fall upon the owner. For bill of tonnage and some other papers of a vessel, stamp-duty and expedition-fee are paid.

Concerning all kinds of dues here mentioned, the Commerce and Navigation committee has proposed altered rules, purposing to lighten the burden of taxes resting on the shipping.

Abroad, Swedish vessels have hitherto paid consulage and, in Great-Britain, a fee to the Swedish church in London. Consulage, which fee, however, recently has been abolished (from 1904 inclusive), was to be paid in a port where there was a Swedish-Norwegian Consul appointed. The fee to the *Swedish church in London* is paid with 0·6 penny per ton by vessels which arrive in London, and with 0·3 penny by vessels which arrive in other parts of Great Britain and Ireland. The Commerce and Navigation committee has proposed the taking away of this fee and its replacement by a corresponding Government grant.

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The Sailors.

Our sailors' occupation and the conditions under which it is carried on in many respects deviating from those of other trades, there exist regarding them certain special arrangements and regulations which should here be mentioned in short.

Various detailed provisos considering the **relation of sailors to their masters** are given in the maritime law of 1891. The captain has to engage and to dismiss the crew. At his being shipped, the sailor gets a balance-book, where the agreement is entered in full. Besides, he is to present himself in person to the muster-master, before whom all the documents regarding the compact are to be laid out and the agreement accepted. He who duly has engaged to go into service at a stated time and fails to do so, can be sent for through the police.

If a seaman is shipped for a certain time, and this expires during the voyage, he must go with the vessel to the nearest wharf. Is he engaged for an unlimited period, he has to stop in the service till the ship arrives at the place of engagement or, if he was shipped in Sweden, till the vessel comes to another Swedish harbour. If the plan of voyage be altered before departure from the place of engagement, dismissal can be insisted upon at once, else only under certain circumstances. Has the sailor been in service for two years, he can — in case the vessel be not going straight to such a place where he can get his dismissal in accordance with the contract — without regard to the contents of the compact claim his dismissal at the first place the ship calls at for loading or unloading. But even before that, he can demand his discharge against substituting another able man, if he proves that he can get the command of a ship or any higher employment on board a vessel. Besides, he is entitled to demand his discharge in case war renders the voyage dangerous, if the ship be not sea-worthy and its defect be not repaired, if the vessel cease to be a Swedish one, or if he be somehow or other ill-treated on board.

The sailor has a right to medical attendance, to free passage home in certain cases, and to security in the ship and freight in case of wages or other compensation not being duly paid.

The wages must be paid even in certain cases of dismissal, or when the service ceases from other reasons; they are to be paid even if the voyage be shortened, and, on the other hand, an additional sum is to be given if the voyage be lengthened above the distance bespoken in the original contract; for extra work special remuneration is expected. The pay falls due at stated times; the captain's balance can, when demanded, be tried by the muster-master.

The captain is entitled to dismiss a sailor who for a certain length of time will be unfit for the service or who suffers from venereal disease. An incompetent sailor or one who conducts himself in a certain stated manner, may be dismissed at any time, and the pay for the period of service still remaining may be reduced to half the amount. For damage he is responsible; breach of duty may be punished with reducement of wages. If half the pay has already been withheld as a punishment, the culprit can be sentenced to arrest of up to 48 hours. Complaints of punishment can be made to the muster-master at the paying-off, as also within a year before the court. For desertion and for breach of duty, penal consequences are ordained.

About the amount of the **pay** (shipping) which under various circumstances is due to the captain and the crew, nothing is stipulated by law but depends on free agreement between the ship-owner, the captain, and the crew, whereas, on the other hand, the **eating regulations** for sailors on board Swedish merchant ships

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are settled by royal proclamation of 1896. The food stipulated in it, the captain has, however, a right to reduce during the voyage when he finds this necessary; for this reduction the crew is entitled to a reasonable indemnification, the amount of which, in case of contest, is decided by arbitrators.

To offer sailors living abroad an opportunity of **sending home savings** — to support relatives at home or for depositing and putting out to interest for future need — the consuls are enjoined to assist in the sending home of those means.

Special institutions for the welfare of sailors are the so-called seamen's register offices and the merchant service pension fund. The former are maintained partly by certain navigation fees (tonnage) (see above), partly by contributions from the sailors themselves; whereas the merchant service pension fund is altogether kept up on State subventions. The **Seamen's Register Offices** (Sjömanshusen) —, which, besides acting as institutions of relief for sailors and their surviving family members, have for their object to keep lists of vessels and sailors —, are 47 in number or one in every staple town of the Kingdom, (i. e., town with customs service). The pensions distributed by the seamen's offices are partly pro tempore ones, for the benefit of which certain conditions are stipulated, partly annuities awarded to sailors in narrow circumstances and no more fit for naval service. These annuities are regulated in accordance with the wants of the applicant and the means of the seamen's office, and are awarded upon the same principles also to seamen's widows and motherless children.

The principal income of the seamen's offices consists partly in *tonnage* paid down for each ship bound for a foreign port, these fees amounting to 3 öre (0·4 *d.*) for Swedish, Norwegian, and certain foreign vessels, or else to 5 öre (0·7 *d.*) per ton (see under the heading Shipping Dues), partly also in *personal fees*, which are paid down by the crew at the paying-off of a Swedish ship coming from abroad. The personal fees are: for a captain 2 %, for mates and engineers $1^1/_2$ %, and for common sailors 1 % of their wages received since the musterday. The tonnage fees at all the seamen's register offices amounted in 1897 to 145,320 kronor, the personal fees to 61,487 kronor, and the pensions and supports distributed, to a total of 141,541 kronor.

The **Merchant service Pension fund,** founded in 1864, was instituted as a compensation for the right formerly accruing to a sailor going abroad of bringing back into the country a certain quantity of commodities custom-free (*föring*). The public treasury subvention amounted in 1902 to 98,000 kronor. Pensions are assigned to sailors employed chiefly in foreign navigation after attaining 55 years of age, and when having been enrolled for 25 years at a Swedish seamen's register office. The pensioners are divided in four classes, the two first of which are intended for captains with a certificate, the third for other captains, mates, and engineers, and the fourth for common sailors and stokers on board steamers. The number of pensions is fixed and at present amounts to 170 in each of the three first classes and 780 in the fourth. The pension sums are 160, 120, 100, and 60 kronor respectively. As pensions were distributed 113,545 in 1902, and the capital fund of the institution at the end of that year was 884,462 kronor.

A reform in the pensioning of seamen has long been meditated, and the matter is at present being brought under discussion in a *Committee* appointed by the Government.

The old committee for workmen's insurance has effected many interesting investigations into the **conditions of life** of sailors, as well as into those of other trades. In the ages of 30/35, 67 % of the captains and mates were found to be married but only 45 % of the sailors, which latter figure is lower than for any other trade. Uncommonly many sailors fall on the parish at an early age.

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Among all the sea-captains who die before leaving their trade, a third perishes by a violent death (chiefly drownage, of course); among the crew as many as *nearly half the number*. In younger ages and during work at the trade, mortality is greater among the crew than among the officers, but in the older ages the case is reversed. At the age of fifty-five, the average length of life is 16·4 years for captains and mates but 16·9 for sailors, engineers, and stokers.

Because sailors spend a very great deal of their time in foreign parts, measures have been taken at several places abroad to afford them **assistance and protection,** e. g. Swedish sailors' chapels and seamen's pastors, sailors' homes, etc. By the National Evangelical Society (see p. 269), a beginning was made in 1869 towards establishing missionary stations; such are now to be found in Liverpool, Grimsby, Boston, Marseille, Hamburg, Lübeck, Bremerhafen, and Melbourne. In Copenhague, there is a Swedish pastor appointed for seamen. In Liverpool, Grimsby, and Melbourne, there are also sailors' chapels. Out of the missionary stations Sailors' Homes have developed themselves (e. g., in London and elsewhere); such Homes also exist in Swedish towns (Stockholm a. o.). The interest for our sailors during their sea-life full of dangers has considerably increased these later years. At several places abroad, often visited by Swedish sailors, nothing has, however, been done as yet for their benefit.

Our **Swedish seamen** have everywhere in the world a good and well deserved reputation for cleverness, courage, and trustworthiness. The merchant fleet of Sweden — at present manned with 25,000 seamen — not affording full occupation for the numerous sea-faring population along our extensive coasts, a great number of Swedish sailors have got employment in foreign service, so that Swedish sailors, engineers, etc. form a considerable part of the crew on board the merchant fleets of the great nations, especially those of the English and Americans.

Old Swedish pilot.
At 72 years of age.

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Gen Stab Lit Anst. Stockh.

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XIII.

INTERNAL COMMUNICATIONS.

The very wide extent covered by Sweden, together with its sparse population and the natural conditions in many parts of the country itself, have for centuries rendered the internal communications of Sweden very imperfect. An important change in this respect was occasioned by the introduction of steam-power, which very soon obtained a wide usage on the great inland seas and lakes of Sweden and along its extensive coasts, an account of which has previously been given under the heading of Inland Navigation. But a still greater improvement was effected through the Railways, which in our country, more than in most others, have brought about a real revolution and now constitute by far its most principal means of communication.

1. RAILWAYS.

The building of railways was commenced late in Sweden, but once begun, it was continued with great energy. On the whole, the network of railways in Sweden, such as it is now in the beginning of the twentieth century, forms the greatest economical and financial achievement that the nineteenth century can boast of in our country.

The real founder of railways in Sweden was Count *A. E. von Rosen* (1797/1886). In 1845, this nobleman received concession to build railways in the central and southern parts of the country on a magnificent if also somewhat extensive plan, which, besides, in its characteristic features is closely identical with that of the present Government railways. Although von Rosen, on account of the general hesitation to embark in the hazardous enterprise, was not actually able to carry out more than an insignificant part of his scheme, he nevertheless succeeded by his unwearied energy in making his views acknowledged as to the necessity of railways. In opposition to Rosen's plan of providing the country with a system of private railways, the Riksdag of 1853 resolved, however, that the main lines were to be constructed as Government ones.

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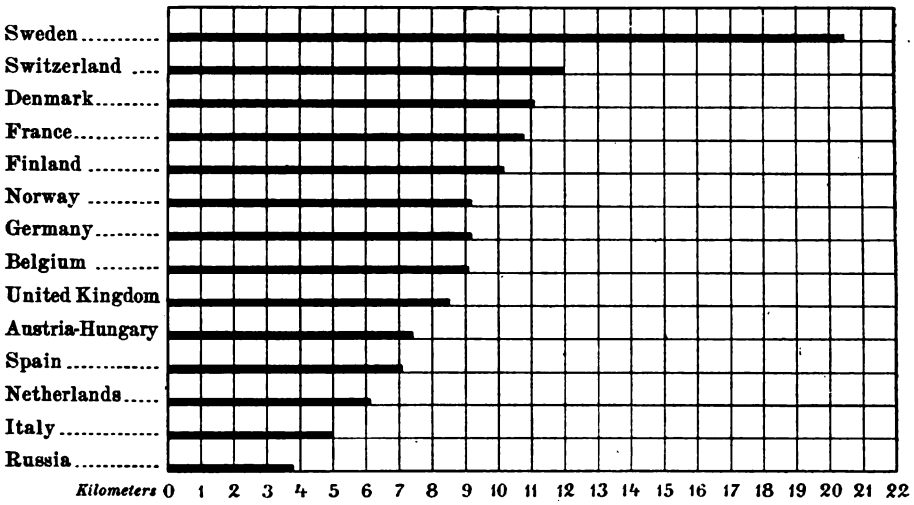
Railways at the end of 1897. Kilometers pr 10,000 inhab.[2]



The commission to carry out this resolution was given in 1855 to *Nils Ericson* (1802/70), already known as a canal constructor, who was for this purpose invested with extraordinary authority.[1] Nils Ericson constructed several of our Government lines and drew up plans for all the Government railways in Central and Southern Sweden. On the 1st of December, 1856, the first Government line was opened (the first private one, some months previously). As to the further development of the Railways, see Table 152 below and the diagram on page 979.

At the end of 1903 Sweden possessed about 12,372 kilometers of railways in actual use, besides which about 700 kilom. are in course

TABLE 152. *Length of Railways in Sweden.* In kilometers.[2]

At the end of the years	State railways.	Private railways.	Total.	Of which in		Gauge.	
				Southern Sweden.	Northern Sweden.[3]	Normal. Kilom.	Narrow. Kilom.
1860	303	204	**507**	374	133	477	30
1865	869	416	**1,285**	1,137	148	1,198	87
1870	1,118	590	**1,708**	1,560	148	1,492	216
1875	1,513	2,168	**3,681**	3,291	390	2,994	687
1880	1,956	3,923	**5,879**	5,075	804	4,638	1,241
1885	2,385	4,505	**6,890**	5,598	1,292	5,451	1,439
1890	2,613	5,405	**8,018**	6,438	1,580	6,343	1,675
1895	3,269	6,486	**9,755**	7,234	2,521	7,744	2,011
1900	3,849	7,453	**11,302**	8,354	2,948	8,681	2,621
1903	4,206	8,166	**12,372**	9,112	3,260	9,593	2,779

[1] Nils Ericson was a brother of the celebrated *John Ericsson* of whom, by the way, it may be mentioned, that he also has left a name in railway history. In the memorable competition at Rainhill in October 1829 John Ericsson also took part, and would in all probability have proven victorious over Stephenson, had not his locomotive met with a temporary accident. — [2] A kilometer = 0 621 mile. — [3] The six northernmost Läns (the five Läns of Norrland and that of Kopparberg).

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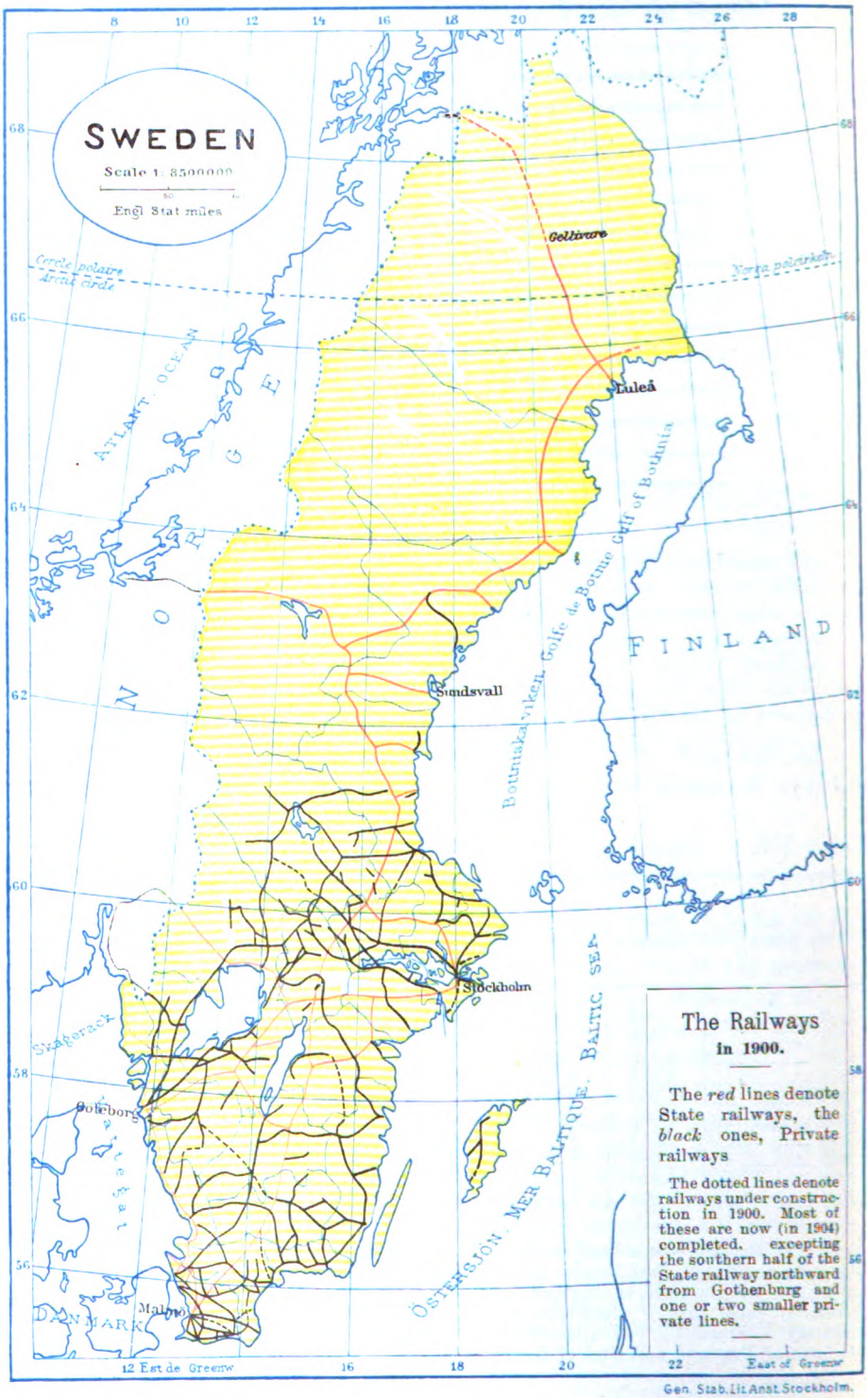

Gen. Stab. Lit. Anst. Stockholm.

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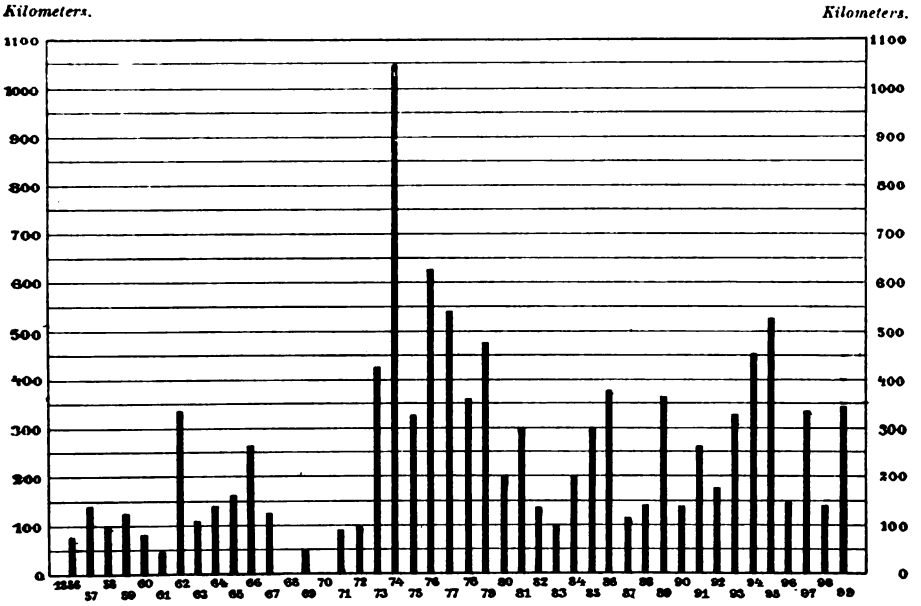
*New railway lines opened in each of the years 1856/1899.**



of construction or have been conceded. In proportion to the *population* Sweden has more railways, than any other country in Europe can show. For every ten thousand inhabitants Sweden has 23·7 km. of railway, while Denmark and Switzerland, which come next to us, only have 12, the average figure for the whole of Europe being somewhat more than 7.

With regard to the sparse population of our country, it is natural enough that circumstances appear somewhat different when the network of lines is compared with the *area*. For every ten thousand hectares Sweden has 2¾ km. of railway, by no means insignificant when the average figure for Europe is about 3; but Sweden's figure is here chiefly caused by the enormous distances in North Sweden. If the six Läns situated farthest to the north are omitted, the figure rises to 5 km. per ten thousand hectares, which is about the same as in Italy. And Malmöhus Län even reaches to 16 km. on the same area, which is more than the average of the British Isles (11 km.) and approaches the state of things in Belgium (22 km.). The mining districts of Central Sweden are also particularly well provided with railways.

Of the whole length of railway lines in use in Sweden at the end of 1903, 4,206 km. were *Government lines* and 8,166 km. were *Private lines* (compare Table 152, page 977). Our most important lines at present are the following:

* In the years 1900/1903 the length of new lines amounted to respectively 595, 271, 377 and 422 kilometers.

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Government railways. *a*) Stockholm—Malmö, 618 km., our principal route of communication with the Continent; a private railway, 32 km., connects Malmö with Trelleborg, from which direct communication by sea is effected via Sassnitz with Germany; *b*) Stockholm—Gothenburg, 458 km., to Katrineholm station in common with the above; *c*) Stockholm—Kristiania, 575 km., to Laxå in common with the above; 439 km. of the whole length belong to Sweden, and 136 km. to Norway; *d*) Stockholm—Uppsala—Bräcke—Boden—Gellivare—Narvik, near Ofoten on the Atlantic, 1,581 km., of which 1,542 belong to Sweden and 39 to Norway; a branch line in the direction towards the Finland frontier is under construction; *e*) Sundsvall—Ånge—Trondhjem, 465 km., 363 km. of which belong to Sweden and 102 to Norway; by means of this line the Gulf of Bothnia and the Atlantic Ocean are joined six or seven hundred km. farther to the south than by the line last mentioned; *f*) Mjölby—Örebro—Krylbo, 253 km., which considerably shortens the distance between the Government railways in the north and in the south of Sweden; *g*) Trelleborg—Malmö—Gothenburg—Kristiania, 689 km., 300 km. of which is the property of the Swedish State, 239 km. belong to private Swedish companies, and 150 to the Norwegian government; *h*) the railway lengthwise through Bohuslän, of which at the end of 1903 the line Uddevalla—Strömstad is ready.

Our **private** railways are divided between more than 100 proprietors and therefore only occasionally constitute large complexes. Of the most important lines may be mentioned: Stockholm—Örebro—Svartå, 267 km., lately, partly (Frövi—Svartå, 75 km.) taken over by the State; Uppsala—Gefle—Ockelbo, 152 km.; Gefle—Falun—Orsa, 194 km., leading to the picturesque country round lake Siljan; Kristinehamn—Mora—Elfdalen, 262 km., between the lakes Venern and Siljan; Gothenburg—Falun, 478 km., west of lake Venern; Halmstad—Nässjö, 196 km., and Nässjö—Oskarshamn, 148 km.; Karlskrona—Vexjö—Alfvesta—Vernamo—Gothenburg, 353 km.; Helsingborg—Jönköping, 246 km., from Öresund to lake Vettern; Örebro—Pålsboda—Norsholm—Hultsfred, 300 km.. etc.

During the last few years attempts have been made in different places to unite, under one management, private lines situated near each other, and with regard to this one ought specially to remember the Traffic joint-stock company Grängesberg—Oxelösund (organized in 1896), which to a large extent has acquired Frövi—Ludvika, Frövi—Köping, and Oxelösund—Flen—Vestmanland railways (altogether 275 km.) and arranges about a considerable traffic of iron-ore from the Grängesberg mines (also acquired by the company) in Dalarne to the harbour of Oxelösund on the Baltic, for export abroad.

To the construction of a large number of our private railways the State has contributed with considerable subventions, in all about 70 million kronor, chiefly in the shape of loans on favourable conditions, besides which the terms of construction, with respect to private railways, generally have been made as little burdensome as possible from the side of the State. The position the State thus has assumed as advancer of capital to no mean extent for private enterprise within the domain of railway building, has powerfully contributed to the great development, according to our circumstances, which the private railways have attained. — Something like 800 km. of railway built by private companies, have in course of time been purchased by the State.

With regard to the **way of building,** it may be mentioned that all the Swedish railways are *single-tracked*, with the exception of some ten km. in Skåne and at Stockholm. On the busiest lines, double tracks will probably be laid down in course of time.

All the Government railways have the *ordinary gauge* (1·435 meters) and likewise 66 % of the length of private lines. Altogether Sweden

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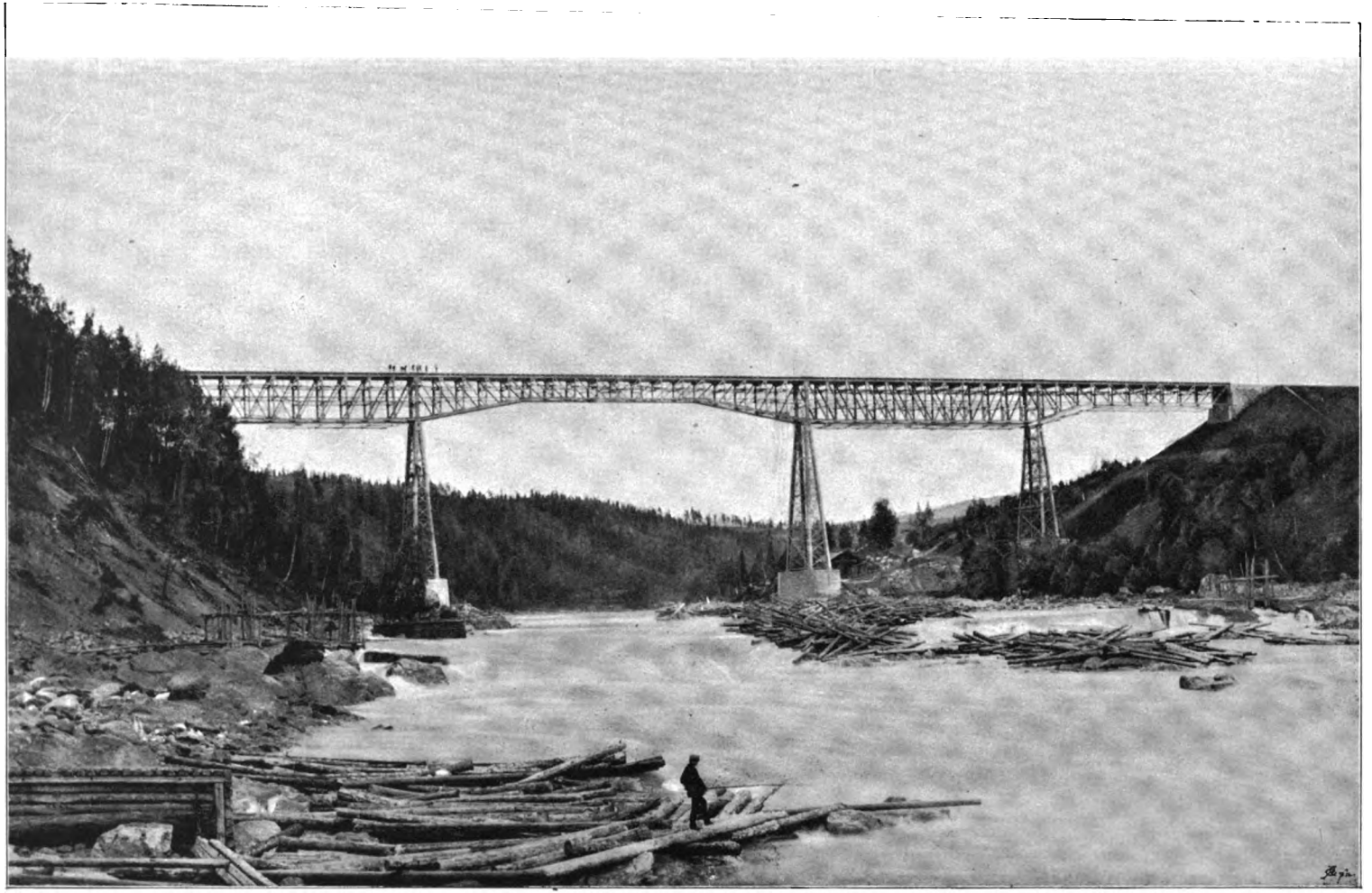

The Forsmo Bridge across the River Ångermanelfven.

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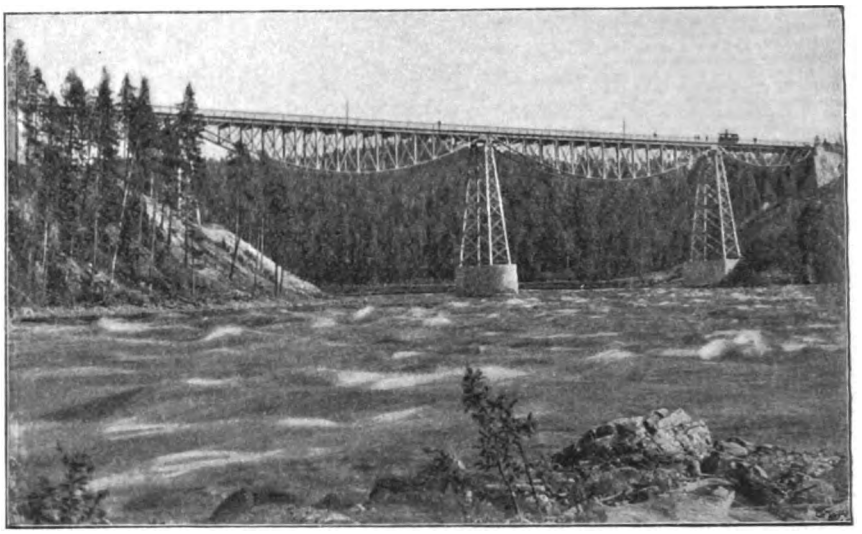

The Bridge across the River Öre elf.

has 9,593 km. of ordinary gauge lines and 2,779 of narrow gauge (cf. Table 152, p. 977). Of the narrow gauge lines 70 % have a width of 0·891 meters, 18 % a width of 1·067; the remaining 12 % are divided on five different gauges down to 0·6 meters, which last exceedingly small gauge (the »Kosta System») is met with on some of the smaller local lines of a length of altogether 105 km.

The weight of rails per meter on the Government railways varies between 40·5 and 27·5 kilogs. Besides those lines in the extreme North of Sweden which are designed for the carriage of ore, the chief lines south of Uppsala are already partly provided with rails of the first above-mentioned weight, and will be more so in process of time as supplies are granted. The weight of rails on the ordinary gauge private lines varies between 40·5 and 17·2 kgs., and on the narrow gauge between 21·5 and 9·0 kilogs. per meter.

On the Government lines steel rails are for the most part used, on the private lines both steel and iron rails. The rails are generally of English, German, or Belgian manufacture. On the larger broad gauge lines the highest gradient is, as a rule, 1 %, and the smallest radius of curvature 300 meters. A number of stations on the chief lines of Government railways have been provided with modern shunt-locking and safety signaling apparatus, on some of the stations in connection with a central adjusting office.

The ample supply of wood in Sweden has up to now made the cost-price of *sleepers* so cheap that their impregnation has not been considered economical. Now they have, however, on the Government railways, begun to impregnate the sleepers, for which purpose specially designed and portable apparatus are employed.

As a particular feature of the Swedish railways, one should notice the numerous, in some cases splendid, **railway bridges**, more especially in Norrland, which have been necessitated by the great number of rivers to be crossed. Many of these can be regarded as good examples of Swedish engineering skill, and among them should be chiefly mentioned the brigde across the Ångermanelf at Forsmo, which is 249·1 meters long, and has five arches, the longest of which is 76·4

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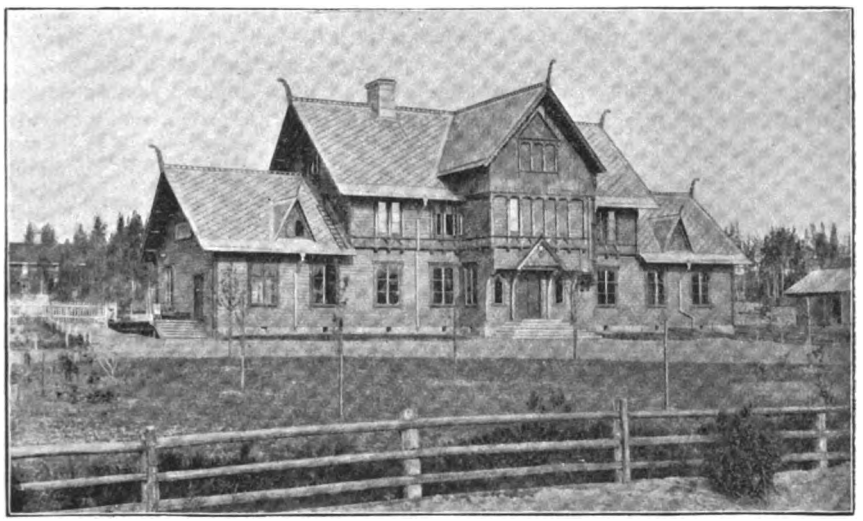
meters, and forms, so far as length and height above the water (40·5 meters) are concerned, the most important bridge-construction that has hitherto been undertaken in Sweden. Further may be mentioned the bridge over Öre elf, which is 168·9 meters long and has four arches, the longest of which is 53 meters; the bridge over Ume elf, which is 178·5 meters long and has three arches, two of which are 59·6 meters each; one of the bridges over the Vindel elf, which is 181 meters long and has four arches, two of which are 62 meters each; and the bridge over Lule elf, which is 162 meters long and has three arches, the longest of which is 62 meters. — Amongst other works of skill we must not omit to mention the *tunnel*, 433 meters, almost in the heart of Stockholm, the two tunnels of the Lappland railway, resp. 837 and 536 m., and the extensive bridge-building, banking, and pilingwork executed in connection with the railway through Stockholm city; also the works, noticeable from several points of view, on the Stockholm—Saltsjöbaden line, amongst which is especially a tunnel 643 meters long, curved and gradient. In connection with this, mention must be made of the extensive quay buildings and loading arrangements that have been commenced at Svartön, close by Luleå, and at Oxelösund — both for the iron ore export.

No notable *station buildings*, except the terminus at Stockholm and the station in Malmö, are worth mentioning. The important increase of traffic has, however, necessitated the rebuilding and enlargement of the stations in some of the larger towns. With this object in view, extensive preparations are at present being made at the head-stations of Stockholm, Gothenburg, and Helsingborg.



Vännäs Station, in the Vesterbotten Län.

The rolling-stock can in its leading features be considered as a comprehension of the English, German, Swiss, and American types of construction, with the special alterations and improvements in detail which best answer the requirements of the country.

The number of **locomotives** amounts to about 1,500, 700 of which on the Government railways; the cost of the latter amounts to about 32 million kronor. Composite engines, which formerly were not employed in traffic, have now begun

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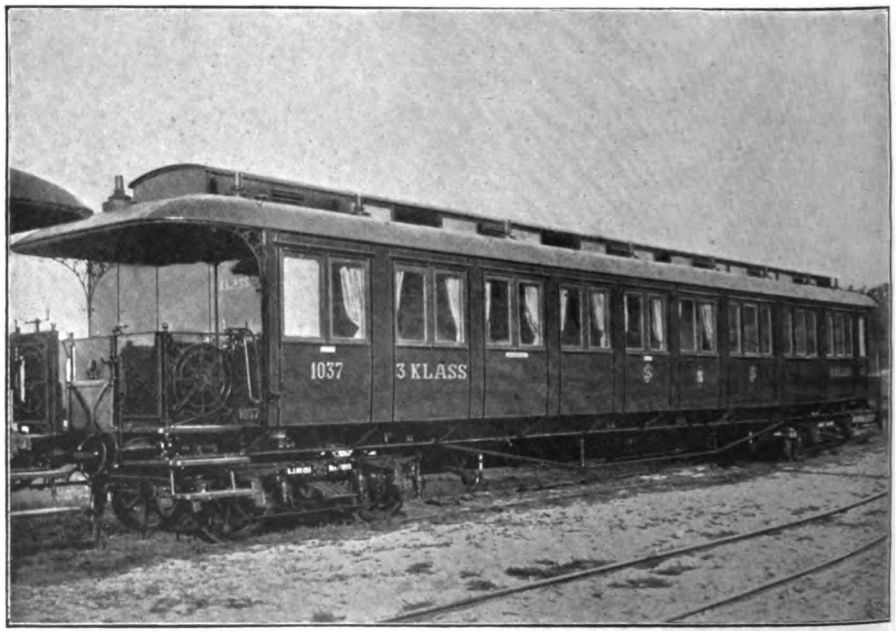
to be used, in additon to which, for the carriage of ore in Norrland, a number of specially powerful eight-linked tank engines, weighing no less than 75 tons, have been constructed. — As fuel, English coal is chiefly used. Still, native coal from Skåne is used to no small extent on the Government railways. On behalf of the Government railways, experiments are at present being made with regard to turning Swedish coal into bricklets, purposing to gain a greater heating effect.

For some time extensive researches have been going on in order to explicate the question in what degree the power of our numerous and large Waterfalls can be used for the *electrical* traction of our railways. Simultaneously our vast *peatmosses* are investigated for ascertaining their utility for the railways of the country.

The passenger carriages amount as a total to 2,700, of which number not quite 1,200 belong to the Government railways. The cost of construction of these latter amounts to 16 million kronor. As well on the Government as on the larger private lines *bogie-carriages*, with side-corridors and a through-passage right along the entire train, have been introduced a few years ago, which, so far as fittings and technical arrangements are concerned, satisfy the most exigent claims. Special *restaurant-carriages* are attached to the principal day trains, and there are sleeping carriages in all the night trains. The comparatively severe climate has caused pains to be taken, on the whole successfully, to warm the passenger carriages in a satisfactory manner, and this has been effected by means of steam from the engine. The lighting in the larger trains on the Government railways is effected by means of oilgas according to the Pintsch system, for the production of which special gasworks are established at several places. Preparations have of late been made for effecting the illumination by means of a mixture of oil- and acetylene gas.

According to the statement of authorities, the passenger cars of the Swedish railways as to equipment and comfort rank rather higher than those of the greater countries.



Bogie-car.

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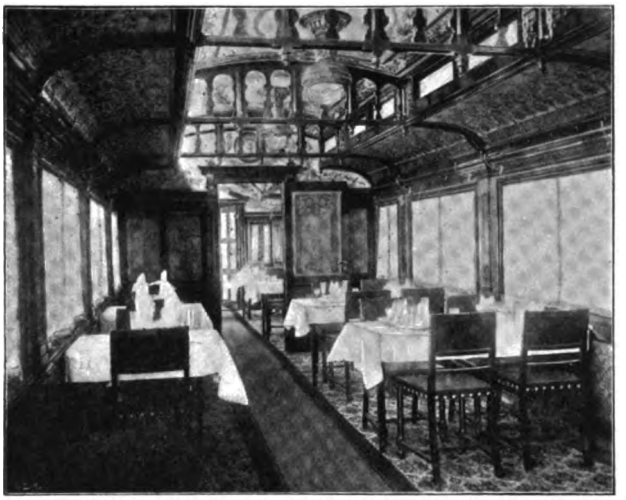

Dining-car.

The Goods wagons of all the railways amount altogether to 35,000, with a total bearing of about 380,000 tons. The cost of building of the 18,000 wagons belonging to the Government railways amounts to 45 million kronor. Among the different types of wagons characteristic for the country and its conditions of traffic, may be mentioned partly the three-axled *ore-wagons*, of which those for the conveyance of ore in Norrland have their bodies made of iron, and are now built with a bearing-capacity of 35 to 45 tons each, partly the so-called *butter-wagons*, constructed for carrying butter and other more delicate articles, and which are provided with treble walls and roofs, refrigerators, etc. — During the last few years the capacity for cargo has been increased, both as regards the three-axled and the two-axled wagons, and some kinds of the latter have a capacity of as much as 16—18 tons each. Powerful brakes are applied to all express trains, according to Körting and Smith-Hardy's automatic system, in addition to which the Westinghouse brake has been applied to the heavy mineral trains going from Gellivare.

With regard to the rolling-stock of the Government railways, this shall, as far as possible, be manufactured in Sweden itself. Of the *factories* which supply the railways with locomotives, the Trollhättan and the Motala mechanical Works have brought the manufacture to a comparatively high state of perfection. The Trollhättan Works produce on an average 50 locomotives per annum and the Motala ones about as many. Factories for the fabrication, on a large scale, of rolling-stock are now to be found in several places, as for instance in Falun and Arlöf.

The railways themselves have also workshops for the *repairs* of stock, some for their actual manufacture. There is a Central Repairing Workshop for the Government railways now being constructed in Örebro, and these own ten workshops of different importance in various parts of the country.

The average speed of passenger and goods' trains is comparatively low; nevertheless, the fastest expresses attain a speed of from 80 to 90 kilometers (50 à 55 miles) an hour.

Management. Tariff.

The central administration of the *Government* railways is effected by the **Board of Railway Directors,** nominated by the Government, whilst the current traffic with belonging regulations are managed by five *District Administrations*, the members of which are also appointed

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by the Government. The private railways, on the other hand, are managed by Boards appointed by the railway companies concerned, in which, in case any public loans or government subventions of any kind have been given, the Government usually has one representative.

Since 1902, there exists at the side of the Railway Board, a *Railway Council*, appointed by the Government and consisting of six representatives of different social interests. This Council is to express itself regarding the more important economical questions submitted to it, either by the Government or by the Railway Board, the chief of which latter also is ex officio chairman of the Railway Council.

Concessions for the construction of private railways are, as a rule, granted by the Government, which also fixes the tariffs for the Government railways as well as private ones. The ordinary regulations for the general rules of traffic on all railways are also issued by the Government, whilst on the other hand, the more special instructions about service, such as with regard to signaling, measures of precaution, etc., are set down by the Board of Government railways both for Government and private Railways. Besides, at the hands of the State, no check has been laid on the freedom of action of the private railways, and their lines are worked under pecuniary as well as administrative independence. Thus for instance, the Boards of private railways have the right to grant, for goods forwarded within their own domains, the privileges and reductions which may seem fit to them. Also with regard to carriage of goods on the Government railways, their Boards can grant reductions if the traffic and returns can, in their opinion, be thereby increased.

As the network of private railways in Sweden, as we have mentioned before, is divided amongst a number of different owners, one has, in order to counteract unhealthy competition, organized a *Joint Traffic Union* (Samtrafikföreningen), in existence since 1882 and consisting of most railways in the kingdom, within which the same rate is charged for carrying goods on the different lines, and likewise the way on which the forwarding is to take place are fixed in common. The beneficent effects of the influence of this Union have extended both to the traveling public and the railways themselves.

The private railways have a special organization in the *Railway Union* (Järnvägsföreningen), formed in 1876, which embraces all the private railways and is composed of the administrations of these lines. It was mainly through co-operation between this Union and the Board of Government Railways, that the above mentioned Joint Traffic Union was founded.

The rate which underlies the charge for freight of goods sent on the lines of the Joint Traffic Union, is founded on the pattern of that which applies to the carriage of goods in the traffic of the *Government railways*. This rate, which has been subjected to repeated revisions, and in its present form — not, however, with regard to the classification of goods, which has been revised in 1895 — is the result of the

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At the Falun—Rättvik railway.

labours of a committee during 1888, is noticeable on the one hand for a detailed classification of goods, and on the other for markedly decreasing freight tariffs, which have been fixed to a number of 12, besides a specially low tariff for certain heavier articles of transport. The new classification of goods includes considerable reductions for certain articles employed in agriculture, forestry, and mining business, such as for manures, feeding stuffs, corn, butter, timber, metals, iron and steel, etc. — The tariffs of the rate for *carrying passengers* are, as far as the middle and southern parts of the kingdom are concerned, not descending, but amount to 8·5, 6, and 4 öre per kilom. (1·8, 1·3, and 0·85 *d.* per mile) for the three different classes respectively of express trains, and 5·25 and 3·5 öre per kilom. (1·1 and 0·75 *d.* per mile) for the second and third classes of other trains. For return tickets the charge is half as much again as for a single journey by the cheaper trains. Considerable reductions have, besides, been conceded for journeys by »combined» tickets, for frequently recurring journeys on the same line. For long journeys on the Government railways *north* of Stockholm, a special tariff, viz., 1½ öre for second class and 1 öre for third class per kilometer over 300 (per mile resp. 0·3 and 0·2 *d.*) has since 1894 been successfully applied.

A scheme for a new passenger tariff on the State railways was during 1903 worked out and submitted to the scrutiny of the Government. This scheme chiefly concerns the furtherance journeys of greater extension and is established on the principle of the *zone-tariff with abating scale.* A good example of the consequences of this method is that,

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At the Lake of Torne träsk, in Lappland.

according to the present tariff, the single fare between Stockholm and Malmö (618 kilom. or 384 miles) third class is 24·75 kronor (27 shillings), and according the new one 13·40 kronor (15 shillings).

Since 1903 a special tourist (luxury) train — the »*Lappland Express*» — runs in summer time once a week between Stockholm and Narvik, thus, from the Capital of Sweden, through the whole of Swedish Norrland and Lappland as far as the Atlantic Ocean, above the arctic circle, — a journey of 1,581 kilom. or almost 1,000 miles. The train is composed of bogie-cars with one compartment for each passenger, with two special conversation and smoking saloons, with a restaurant car, etc.; it affords all the latest modern comforts, and offers undoubtedly the most convenient passage, hitherto in existence, to visit the regions of »The Midnight sun».

The staff which attends to the traffic on the Swedish railways may at present be reckoned to amount to about 30,000 persons, 16,000 of whom have regular or permanent employ. About half of the above numbers are engaged on the Government railways. The closest supervision over the employés is exercised by the *superintending staff of the line*, which also controls the safe and regular train service, etc. The nomination and dismissal of employés is — except in the case of high officials on the Government railways, who are appointed and dismissed by the Government, — effected by the respective Boards or immediately subordinated authorities, and the Government has — with regard to the staffs of the private lines — not thought fit to fix any general rules for employment except in requiring an examination conducted by a specialist as to the sense for colours of the party concerned.

No general rules are set down with regard to the *length of the working day*, but, with regard to the particularly trying and important service devolving on the train-staff, attempts have been made to render that service as little onerous as circumstances permit. With regard to *Sunday labour* on the part of the staff, reductions have been made in respect to goods traffic, inasmuch as neither receiving nor delivering of goods takes place on such days, in addition to which a number of goods trains are discontinued. With regard to the staff of the Government lines, it is laid down that they, so far as possible, are to enjoy leave of absence every third Sunday so as to attend Divine Service. *Nightwork* naturally occurs both for the train-, station-, and inspection staffs on lines where night trains run. This, however, chiefly concerns the Government railways.

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The rates of wages vary of course on different lines and for different kinds of service. In the main, these may be said to equal, or to be higher than those paid on railways in neighbouring countries. The marked increase of late in the expenses of living has, however, led to regulations in the wages of the staff. With regard to Government railways, such regulations came into operation at the beginning of 1898; and in respect to many of the private lines, regulations have the last few years gradually taken place. A signalman or porter on the Government railways at present enjoys, including 250 kronor (a krona = 1·10 shilling) being the value of house furnished with fuel, and 96 kronor for clothing, as a minimum 826, as a maximum 1,126 kronor a year. A line-man gets, including the same privileges, at least 826, at most 1,006 kronor per annum. From these wages, however, are deducted the fees the staff is obliged to pay towards pensions. The system of self-help in the form of Savings- and Relief funds, Life Insurance Unions, and such like institutions has become extremely popular amongst railway *employés* throughout the entire kingdom; and, in connection with these, mention should be made of the *Pension institutions* established and which — with the object partly of affording security for the members themselves in old age, partly as a means of support for those they may leave behind them — are supported; that formed for the staff of the Government railways, by the Public Treasury; and that instituted for the staff of the private railways, by the lines interested.

No railway lines from a purely **strategical** point of wiew, have up till now been built in Sweden, but the project for every proposed new line must be scrutinized beforehand by the Staff general, with regard to military claims. The control of works for the use of railways for military objects, belongs in the first place to the chief of a special Department of the Staff general for matters relating to communications, in which department careful plans for making use of railways in mobilizing, strategical deployment, and concentration of troops are elaborated. At the field-manœuvres of more or less importance, which annually take place, the railways and their staffs have proved themselves equal to the military requirements.

Traffic and Finances.

At the end of 1901, the capital invested in all the railways built in Sweden was estimated in round figures to a total of 760 million kronor, which is equivalent to about 67,000 kronor per kilom. (or 5,800 £ per mile). This average figure is lower than in any other country in Europe. On the average a kilometer of European railway costs something like 258,000 kronor, quite four times as much as a kilometer of Swedish railway.

The cause of this remarkably low cost of construction in Sweden must, in the first place, be sought in the fact that almost all our lines are still single, and generally, as calculated for a less heavy traffic than the great main-lines abroad, can have restricted themselves to a less extensive arrangement of railway stations and of rolling stock. A number of other circumstances also contribute to the low cost of construction, viz. that the requisite ground often, more especially on the long stretches across Norrland, has been furnished free of cost by the County Councils, parishes, and private persons, and that the construction of lines, with the exception of the above mentioned costly bridges, has been carried out without expensive erections.

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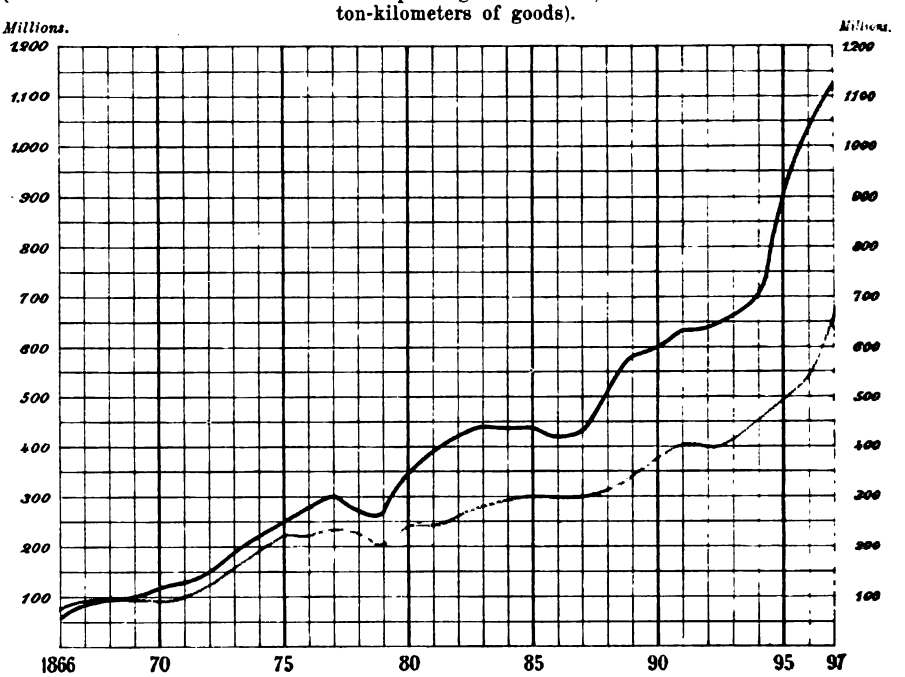
The Traffic on the Swedish Railways, in 1866/97.[1]

(The *red* line denotes the number of passenger-kilometers, the black line the number of ton-kilometers of goods).



At the end of 1901 the cost of construction of the Government railways amounted to about 370 million kronor and that of the private railways to about 390 million kronor. The cost of the former per kilom. consequently comes to about 90,000 kronor, of the latter to about 50,000 kronor. The ordinary gauge private lines separately cost about 62,000 kronor per km. and the narrow-gauge 30,000 kronor.

Data with regard to the extent of the traffic on the Swedish railways are given in Tables 153 and 154, and with regard to the financial result in Tables 155 and 156.

The total **passenger traffic** in 1901 amounted to 77,000 passenger-kilom. per kilom. of railway, and on the Government railways alone to 124,000, but on the private lines only to 53,000. Only on some smaller distances the European average (314,000 passenger-kilom. per kilom. of railway) is reached or exceeded, which is chiefly due to the sparse population of Sweden but partly also to the competition with the communications by water, so numerous in our country. Every inhabitant of Sweden traveled in 1901 on the average 175 km. by rail; the corresponding average figure for Europe is 223 km. From this point of view the passenger traffic in Sweden does not fall so far below the average. — Of the total number of passengers in 1901 (apart from the transport of troops) 8·4 % traveled 1st or 2nd class, and 91·6 % 3rd class.

[1] In the years 1898/1902 the number af passenger-kilometers has been resp. 683, 771, 833, 886 and 909 millions, and the number of ton-kilometers of goods resp. 1,260, 1,338, 1,470, 1,469, and 1,500 millions.

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TABLE 153. *Passenger traffic on the Swedish Railways.*

Average for the years	Number of passengers. In thousands.			Passenger-kilometers. In millions.			Gross receipts of the passenger traffic. Thousands of Kronor.		
	State railways.	Private railways	Total.	State railways	Private railways.	Total.	State railways.	Private railways.	Total.
1866/70	1,498	837	**2,335**	77·22	20·51	**97·73**	2,585	727	**3,312**
1871/75	2,524	1,805	**4,329**	127·66	43·20	**170·86**	4,724	1,613	**6,337**
1876/80	3,168	3,741	**6,909**	144·87	90·48	**235·35**	6,158	3,927	**10,085**
1881/85	3,708	4,729	**8,437**	171·44	111·43	**282·87**	7,334	5,031	**12,365**
1886/90	4,240	6,476	**10,716**	188·56	145·70	**334·26**	7,770	6,297	**14,067**
1891/95	5,108	10,408	**15,516**	223·16	220·50	**443·66**	8,636	8,820	**17,456**
1896/00	9,331	16,290	**25,621**	389·23	312·69	**701·92**	14,176	11,654	**25,830**
In 1896	7,729	12,631	**20,360**	305·10	238·81	**543·91**	11,474	9,372	**20,846**
» 1897	8,522	14,216	**22,738**	398·29	280·15	**678·44**	14,024	10,426	**24,450**
» 1898	9,239	16,231	**25,470**	369·86	313·40	**683·26**	13,735	11,650	**25,385**
» 1899	10,217	18,487	**28,704**	418·46	352·83	**771·29**	15,426	12,995	**28,421**
» 1900	10,949	19,882	**30,831**	454·43	378·26	**832·69**	16,222	13,827	**30,049**
» 1901	11,436	21,835	**33,271**	476·63	409·59	**886·22**	16,782	14,660	**31,442**
» 1902[2]	11,680	22,300	**33,980**	488·53	420·00	**908·53**	17,068	14,800	**31,868**

The Goods traffic in 1901 amounted to 129,000 ton-kilom. per kilom. of rail, on the Government lines to 210,000 and on the private lines to 87,000. A number of private railways in the mining-districts, however, reach more than 700,000 ton-kilom. per railway kilom., and the Government railway Gellivare—Luleå approaches 1 million ton-kilom. per railway kilom., which represents an extraordinary heavy traffic. The average for European railways is 514,000. Per inhabitant the Swedish railways perform a work of goods-transport of 290 ton-kilom. per annum, against Europe's average of about 366. — Of goods carried on the Government railways in 1902, calculated according to weight, timber formed 19·87 %, ore 19·99 %, coal and coke 5·94 %, stones and different kinds of earth, bricks, and asphalt 5·96 %, iron and steel 5·45 %, and corn 5·50 %.

TABLE 154. *Goods traffic on the Swedish Railways.*[1]

Average for the years	Goods carried. Thousands of tons.			Ton-kilometers. In millions.			Gross receipts of the goods traffic. Thousands of Kronor.		
	State railways.	Private railways.	Total.	State railways.	Private railways.	Total.	State railways.	Private railways.	Total.
1866/70	479	1,022	**1,501**	57·81	35·34	**93·15**	3,387	2,584	**5,971**
1871/75	1,036	1,998	**3,034**	125·22	62·68	**187·90**	6,713	4,591	**11,304**
1876/80	1,508	3,292	**4,800**	174·44	118·92	**293·36**	9,316	8,801	**18,117**
1881/85	2,119	4,993	**7,112**	226·74	200·68	**427·42**	11,855	13,062	**24,917**
1886/90	2,591	5,929	**8,520**	262·32	246·97	**509·29**	12,523	14,576	**27,099**
1891/95	3,300	8,868	**12,168**	333·40	375·27	**708·67**	14,726	19,611	**34,337**
1896/00	5,897	13,080	**18,977**	658·93	585·36	**1,244·29**	23,757	26,574	**50,331**
In 1896	5,033	11,365	**16,398**	516·44	513·06	**1,029·50**	19,852	23,058	**42,910**
» 1897	5,608	12,625	**18,233**	568·06	555·98	**1,124·04**	21,736	25,118	**46,854**
» 1898	5,868	13,010	**18,878**	669·74	590·64	**1,260·38**	23,740	26,564	**50,304**
» 1899	6,190	13,476	**19,666**	735·83	601·87	**1,337·70**	25,561	27,765	**53,326**
» 1900	6,788	14,923	**21,711**	804·57	665·27	**1,469·84**	27,896	30,366	**58,262**
» 1901	6,789	14,742	**21,531**	815·97	652·66	**1,468·63**	27,810	29,587	**57,397**
» 1902[2]	6,889	14,900	**21.789**	839·52	660·00	**1,499·52**	28,739	29,900	**58,639**

[1] A ton = metric ton à 2,204 *lbs.* A ton-kilometer = 0·612 ton-mile (Eng. ton). A krona = 1·10 shilling or 0·268 dollar. — [2] For the private railways the figures are provisional.

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TABLE 155. *Income and expenditure of the Swedish Railways.*[1]

Average for the years	Average length during the years. Kilometers.			Gross receipts. Thousands of Kronor.			Expenditure. Thousands of Kronor.		
	State railways.	Private railways.	Total.	State railways.	Private railways.	Total.	State railways.	Private railways.	Total.
1866/70	1,047	602	**1,649**	6,051	3,430	**9,481**	3,592	1,721	**5,313**
1871/75	1,299	1,080	**2,379**	11,585	6,403	**17,988**	6,523	3,396	**9,919**
1876/80	1,698	3,045	**4,743**	15,688	13,184	**28,872**	10,498	7,446	**17,944**
1881/85	2,228	4,096	**6,324**	19,420	18,650	**38,070**	11,753	9,768	**21,521**
1886/90	2,513	4,915	**7,428**	20,531	21,509	**42,040**	14,082	11,305	**25,387**
1891/95	2,893	5,752	**8,645**	23,688	29,217	**52,905**	16,427	16,057	**32,484**
1896/00	3,683	6,575	**10,258**	38,354	39,407	**77,761**	25,234	21,899	**47,133**
In 1896	3,653	6,116	**9,769**	31,773	33,325	**65,098**	19,401	17,071	**36,472**
» 1897	3,676	6,233	**9,909**	36,102	36,512	**72,614**	20,677	18,649	**39,326**
» 1898	3,676	6,554	**10,230**	37,824	39,363	**77,187**	23,316	20,690	**44,006**
» 1899	3,680	6,749	**10,429**	41,446	42,161	**83,607**	28,802	24,403	**53,205**
» 1900	3,729	7,223	**10,952**	44,626	45,672	**90,298**	33,975	28,683	**62,658**
» 1901	3,838	7,496	**11,334**	45,211	45,710	**90,921**	36,409	28,778	**65,187**
» 1902[2]	3,856	7,700	**11,556**	46,418	46,150	**92,568**	34,829	.	.

Of *late years* the goods traffic on our lines has greatly increased, as appears by the diagram on page 990. Especially has the ore traffic increased in northern and central Sweden and the sugar-beat traffic in the South. A further considerable increase of goods traffic is expected after the opening (in 1903) of the Gellivare—Ofoten railway, the traffic on which is assumed to attain from the very beginning at least 300 million ton-kilom. per annum, corresponding to about one quarter of the entire goods traffic on all our present railways.

The financial result of our railway industry of course varies considerably for different lines, but has, on an average, lately proved very remunerative for the entire network of railways. In 1897, which certainly was, as 1898, extraordinarily favourable, our railways yielded a net profit of 5·19 % on invested capital (the Government railways 4·74 %, the private railways 5·66 %). Such a high average is only reached by a few other European countries, the European average being about 4 %. The explanation of this result so favourable for Sweden, is of course firstly the above mentioned cheap costs of construction, added to which also come the comparatively cheap working-expenses. During the last few years, however, working-expenses have so considerably increased that the net profits have diminished. During 1902 the returns from the Government lines were only 3·04 %. For further details see Table 156.

As to railway **accidents** we only have full accounts from the *Government lines*. During the period of 47 years 1856/1902, a total number of 8 *passengers* have been killed without any fault of their own; which is equivalent to *one* loss of life for 986 million passenger-kilom. If we include the 25 fatalities caused by the passengers' own carelessness, the quotient reaches one fatality per 239 million passenger-kilom. Besides this, 16 travelers have been *injured* through no fault of their own, and 48 through carelessness. 24 travelers have consequently been killed or wounded through no fault of their own, or 1 for every 329 million passenger-kilom., and, altogether have been killed or injured, on the whole, 97 travelers or 1 for every 81 million passenger-kilom. Of *railway-men* 1,821 have been injured by accidents, 373 out of which number with fatal results. As to *other people* 620 have been injured, 439 of whom died.

[1] Exclusive of some smaller lines, for which traffic returns are wanting. A krona = 1·10 shilling or 0·268 dollar. — [2] For the private lines the figures are provisional.

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TABLE 156. *Net revenue of the Swedish Railways.*[1]

Average for the years	Capital paid up.[1] Thousands of Kronor.			Net revenue. Thousands of Kronor.			Net revenue, in % of Capital.		
	State railways.	Private railways.	Total.	State railways.	Private railways.	Total.	State railways.	Private railways.	Total.
1866/70	82,320	30,980	**113,300**	2,459	1,709	**4,168**	2·99	5·52	**3·68**
1871/75	119,096	53,661	**172,757**	5,062	3,007	**8,069**	4·25	5·60	**4·67**
1876/80	171,001	175,115	**346,116**	5,190	5,738	**10,928**	3·04	3·28	**3·16**
1881/85	215,556	232,407	**447,963**	7,667	8,882	**16,549**	3·56	3·82	**3·69**
1886/90	245,171	256,413	**501,584**	6,449	10,204	**16,653**	2·63	3·98	**3·32**
1891/95	274,622	295,884	**570,506**	7,261	13,160	**20,421**	2·64	4·45	**3·58**
1896/00	329,967	330,697	**660,664**	13,120	17,508	**30,628**	3·98	5·29	**4·64**
In 1896.....	310,386	316,889	**627,275**	12,372	16,254	**28,626**	3·99	5·13	**4·56**
» 1897.....	325,580	315,654	**641,234**	15,425	17,863	**33,288**	4·74	5·66	**5·19**
» 1898.....	329,431	326,662	**656,093**	14,508	18,673	**33,181**	4·40	5·72	**5·06**
» 1899.....	335,556	338,359	**673,915**	12,644	17,759	**30,403**	3·77	5·25	**4·51**
» 1900.....	348,880	355,923	**704,803**	10,651	16,989	**27,640**	3·05	4·77	**3·92**
» 1901.....	365,171	373,690	**738,861**	8,802	16,932	**25,734**	2·41	4·53	**3·48**
» 1902[2].....	396,493	·	·	11,589	·	·	2·92	·	·

The above figures for the net profit demonstrate that our railways produce a rather good profit from a purely financial point of view. As regards the *indirect* result of our railway industry, that cannot be easily illustrated by exact figures, but doubtlessly the marked development our national resources have gained during the last decades is closely connected with the building and extension of our railways, which have also powerfully counter-acted the economical and social isolation which the long distances have always tended to establish between the various parts of our vast but sparsely populated country.

2. TOWN COMMUNICATIONS.

The enormous growth of population, administration, and industries in the large towns has brought about a development in their means of communication which constitutes one among the most characteristic traits of our days. Sweden possessing merely two or three towns of any considerable size, and even this being a rather moderate one, there will of course not be the question about any competition with the great countries in this respect, but yet, in proportion to population and traffic, the means of communication are in a rather good state of development

[1] Average of the amounts in the beginning and at the end of each year. A krona = 1·10 shilling or 0·268 dollar. — [2] For the private railways, the figures for this year are not yet available.

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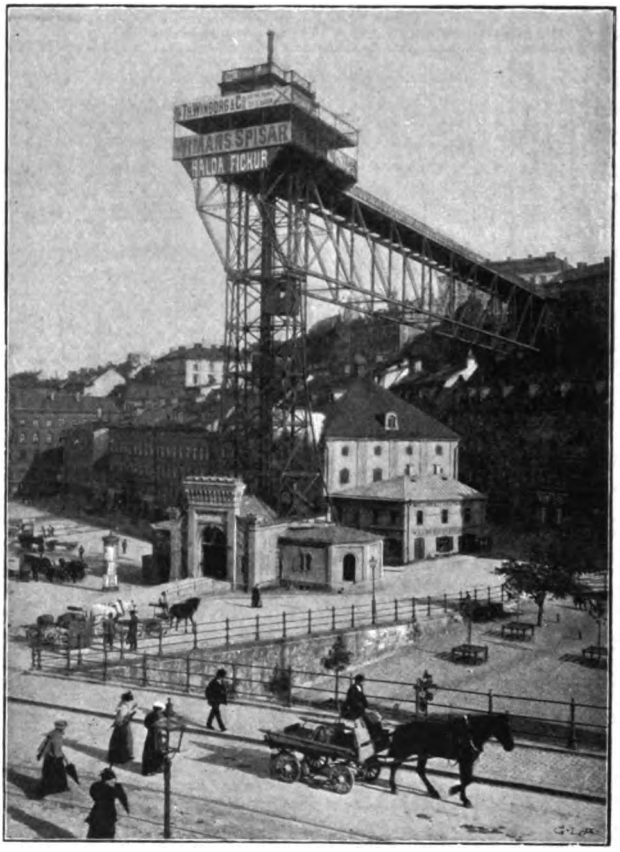
in the larger towns, especially is this the case in Gothenburg and Stockholm. It may be worth mentioning that the *railways* of our country only to a very slight extent are utilized for local traffic.



The Katarina Elevator in Stockholm.

Quite characteristic means of communication within **Stockholm** are those numerous *little steamboats* that for decenniums have been keeping up a lively traffic on the many waterways of the capital. Of late, the tramways have, however, proved a check to their further progress. To keep up the traffic in Stockholm and its immediate environs, there were in 1902, 64 steamboats and ferries, each of which could accommodate 123 passengers on the average. The number of daily runs is on some lines exceedingly large, and the number of passengers amounts to several millions a year; an exact statement in figures about this concern does not exist though. — The length of *tramway lines* is 24·55 kilometers, and, in round numbers, they carried in 1903, 19·11 million passengers, corresponding on an average to about 60 runs per inhabitant. The tramways are in the possession of two companies: one for the Northern parts of the town, with lines of 19·31 kilom. and 15·90 million passengers, and one for the South, with lines of 5·24 kilom. and 3·21 million passengers. The latter company has been keeping up the traffic, during several years, by means of steam trams and now uses electric motors. From 1904 also the Northern trams have introduced electric running. — The hilly ground of Stockholm has given rise to peculiar means of communication in the two *elevators* to the South (those of Katarina and of Maria, with about 1 million passengers each per annum) and the *Brunkeberg tunnel* running under the Brunkeberg ridge, with $1^1/_2$ million traffickers a year. — The *omnibus* traffic of Stockholm is little developed and chiefly calculated upon the immediate neighbourhood during the summer months.

In **Gothenburg**, the *tramway* traffic was originally delivered into the hands of a foreign (English) company, which circumstance proved an impediment to its progress. Lately, however, the Gothenburg tramways have been purchased by the

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town, and several reforms and enlargements have now been carried out in connection whith the transition to electric running. The length of lines at present amounts to 30 kilometers and, in 1903, the number of passengers to 10·63 million, thus about 80 runs per inhabitant. — Besides Stockholm and Gothenburg, **Malmö** and **Helsingborg** are the only towns in Sweden where *tramways* are at present to be found; yet, such are in preparation in **Norrköping** and some other towns. The length of lines in Malmö, in 1903, was 5·35 km. and the number of passengers 1·58 million; in Helsingborg the length of lines is likewise 5·35 kilometers.

That the *telephone system* in our Swedish towns has attained a high degree of perfection will be shown below.

3. COUNTRY ROADS.

At the end of 1895, Sweden had 59,550 kilometers of **country roads** or, on an average, 13·3 km. per a hundred sq. km. of its land surface. In the six most northerly Läns, there were, however, only about 4·3 km. of country road per a hundred sq. km., whereas in the middle and southern parts of the kingdom the corresponding figure amounted to 31·9 km. For the Län of Malmöhus, the proportion runs up to 64 km. country road per a hundred sq. km. but stops in the Län of Vesterbotten at 0·5 and in that of Norrbotten at 0·3. (A kilometer = 0·621 mile).

In a thinly populated country with a configuration so hilly as that of Sweden, the construction of roads between the farms and village communities and their keeping in repair, must have been a heavy burden on the people. For this reason it was not possible in olden times and during the whole of the Middle Ages to get anything but a small number of roads constructed that were practicable for vehicles. The »Eriksgata», i. e., the road used by the newly elected King when making his progress to receive the homage of his people, formed a circuit through the middle parts of the kingdom, enclosing the lakes of Vettern and Hjelmaren and the western part of the Mälaren. But even this road was in times of old certainly nothing but a horse-path. From various points of that »Eriksgata», roads opened out towards circumferential parts of the country, e. g., one south-easterly to Kalmar, one south-westerly to Halmstad, a westerly one to the estuary of Göta elf, a north-westerly one to Kopparberget in Dalarne, and a north-easterly one to the coast of the Gulf of Bothnia. In the time of Gustavus Vasa, it was decreed by the Riksdag at Vesterås (1544) that all public roads should be cleared by the help of the common people and at their expense, »so that all the roads might be passable without any risk, both from Ny-Lödöse (now the Gamlestad of Gothenburg) towards Kalmar and from there to Stockholm, likewise all the other roads necessary», further that the peasantry of northern Vestergötland should »clear the Tiveden forest (between the provinces of Vestergötland and Nerike), so that people easily might come across with carriages». In spite of this, it is rather unlikely that a *drive* was really constructed across the Tiveden. Far into the 16th century, assemblies of importance were almost exclusively held in towns that could be reached by boat. According to a description still extant and written by a German traveler about his journey from Helsingborg via Jönköping and Norrköping to Stockholm, in 1586, the way was in wintertime generally laid across frozen lakes and plain ground, whereas in summer the way by water was preferred,

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›for›, he says, ›because of the deep roads and the marshy lands it is difficult to make one's way on horseback‹.

But from time to time, arrangements were made to improve the roads. In 1664, it was enacted that all thoroughfares between towns, parishes, and courts of assizes should be improved, in some places they should be altered, leveled, and straightened. In this connection the roads were divided into various parts to be kept ›well cleared and in good repair‹ by the peasantry; at the same time an ordinance was issued about surveying the roads and putting up mile-posts. Nevertheless, at the end of the 18th century there existed but few carriage roads except the highroads, and, on the whole, it was not till the 19th century that the roads of Sweden were put into a condition comparable with their actual state. In Skåne, *S. G. von Troil*, Governor at Malmö (1851/74), made himself known on account of his successful attempts for the improvement of the roads.

Since 1840, the State has, to an ever increasing extent, contributed towards keeping the roads in a good condition. That same year subventions to the amount of 75,000 kronor were granted ›for the laying out of new roads or else for the improvement and reconstruction of hilly and rather bad roads‹; moreover, the people in the neighbourhood of them were enjoined to contribute towards the costs of construction as well as to take the maintenance upon themselves for the future. The supply has ever since constantly been on the increase, so that in 1900 an amount of 1 million kronor was granted for the purpose. By those means a length of road of about 13,000 km. has been constructed or improved since 1840.

The construction of *new roads* has of late chiefly been carried on in the North of Sweden. During 1841/1900, State subventions of 20·85 million kronor were granted for the construction of new high-roads and the repavement of old ones; the total cost calculated for these roads amounts to 32·22 million kronor. Out of the State grant, 2·68 million kronor have fallen to the Län of Norrbotten and 2·49 to that of Vesterbotten. Of late years, the share of Norrland has still more increased, so that for 1896/1900, an amount of 1,885,000 kronor fell to the four northernmost Läns out of a total of 4,054,000 kronor. — In several Läns the County Councils also grant subventions for construction and repavement of roads.

Conformably to old decrees of law, the roads were divided into four kinds: high-roads, that should be 6 meters wide (20 feet), church-roads and mill-roads, which should be 3·6 m. wide (12 feet), and market-roads. In the 18th century, there was also a difference made between court- or hundred-roads, uniting two hundreds and their courts of assizes, and parish-roads, comprising the former church- and mill-roads; less important were the village-roads, that had to be kept in good repair by the respective villages. During later times the public roads were classified into high-roads or king's highways, hundred-roads, and parish-roads. The law of 1891 concerning roads, which has been in force since 1895, makes no other difference than between *highroads* and *village-roads*. In 1895, there were 20,287 km. of highroads and 38,462 km. of village-roads, to which may be added the 801 km. of streets of towns considered to constitute part of the line of roads in the kingdom.

Keeping the roads in repair has of old fallen to the soil, i. e., to all those in Sweden who owned and cultivated the ground, and was consequently quite early divided among the farms. Only the construction and repair of large bridges was made a joint business of one or more hundreds.

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From the time of the Vikings, many runic stones commemorate men who had built roads or bridges. And the fact that the Church — though, in general, as far as possible releasing her soil from contributions — constantly for her estates partook in the repair of the roads, bears witness of this work being considered as highly important for mental culture and for the interest of the Church, as also of its being too oppressive to be supported by the assessed land alone. The expedient resorted to in many places abroad of finding means for the repair of the roads by levying a fee from the way-farers, has only to a small extent been put into practice in Sweden and then chiefly at large bridges, for the construction of which the communities or the hundreds have been obliged to raise a loan with a long period of instalments.

For many centuries, the repair of roads has been incumbent only on the soil assessed, i. e., the farm-owners, with exemption, though, of certain farms, works, mills, taxed outlying grounds, and the country parsonages of town clergymen; the properties with special privileges (Säterier) in Bohuslän, Halland, Skåne, and Blekinge — provinces ceded by Denmark to Sweden in 1658 — have also been dispensed from road-service. Previous to 1895, the hundreds had to keep the highroads and hundred-roads, each parish kept its parish-roads, and each town the roads within its own precincts. After many complaints about this burden, the road-service was finally, by the **Law about roads of 1891**, also transferred on other taxable objects than landed estates. Since 1895, a certain tax is levied on each »vägfyrk», and one such »fyrk» (taxation-unit) is levied on landed estate (common woods excepted) for each 6 öre of the tax called General Supply (Allmänna Bevillningen, see p. 208), on other landed property (as well as common woods) for each 20 öre, and on income of capital or work, for each 30 öre. Small parcels of land, income from means of communication, magistrates' salaries and income from State tenement lands are, however, exempt from partaking in the road-service.

The keeping of the roads in repair is effected in kind by those who possess landed estate, with the exception of common woods, and among them, all the roads of each **road-district** are divided according to the assessed value of their farms. The district of roads generally corresponds to that of the hundred. To the amount required for keeping the roads of the whole district, the State contributes $^1/_{10}$, and the remaining $^9/_{10}$ are distributed on all the »vägfyrks» (see above) of the district and paid down in money into the road-fund by those who have not already come down with their road-tax in kind. With these means the Road-fund must pay the costs of administration, snow-ploughing, the repair and construction of bridges, and more casual expenses. If the means do not prove sufficient, additional ones must be levied in money on all the »vägfyrks». If again a surplus arises, this can be used for a basement repair of the roads, or if this be not required, for an alleviation of the road-service (abatement of the taxes for the following year). The State also partakes in the cost of (the first) partition of roads or their »gradation» (valuation) and distribution among those having to do road-service in kind. Other duties belonging to the administration of roads devolve on a *Board of roads* chosen by the road-keepers of each district and are controlled by an annual *road-survey*, done by the magistrates bound to keep order in the province, with the assistance of two jurates (Nämndemän).

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The *towns* must keep their roads in repair themselves and by their own authorities superintend those who have to do the road-service (proprietaries, contractors, or hired workmen). The keeping of *village-roads* depends on agreement between those who use them, and disputes on that question, as a rule, are settled at the courts of justice, on grounds of equity.

The *condition* of roads has been very greatly improved of late and is in general satisfactory, some districts excepted, however, especially in the northern parts of the country.

On various highroads, of a total length of 37,954 km., regular **post-traveling** is established, so that people are sure to get a horse and carriage against a fare stipulated by law. The whole number of *roadside stations* amounted at the end of 1895 to 1,518, the distance between them being about 25 km. (15½ miles). On the average, a conveyance with one horse costs about 16 öre per km. (3·4 *d.* pr mile), but the cost varies considerably at different stations. An institution that since times far back has been connected with post-traveling is that of **country-inns.**

In olden times, nearly every traveler drove his own horse and tried to get night-lodgings with the clergymen or the peasants; with a hospitality, old as the hills, shelter was — with or without payment — willingly granted to the wayfarers. But with the rising power of the gentry and the clergy, their claims on the generosity of the peasantry also grew, and as early as in the 13th century, taking by violence from the peasant what he did not give voluntarily — so-called forced quarters — had become so common a custom that legislation had to interfere. By an ordinance given at Alsnö about 1280, King Magnus Ladulås forbad to take forced quarters, and it was enacted that in every village there should be an **innkeeper** or farm-steward, who against reasonable payment and on strict responsibility was bound to provide wayfarers with their necessities. Among those who traveled on State business it became more and more customary during the Kalmar Union (1389/1523) to accept food and lodgings gratuitously, and King Gustavus Vasa (1523/60) sanctioned by law the **transport for the crown,** i. e. the duty of the peasants without any payment to convey the royal family and members of the court (king's post), troops and military munitions (transport for the crown, properly spoken), and prisoners (prison post). Restrictions in the duty of transport for the crown were often proposed, but it was not until 1689 that payment was stipulated for all kinds of transport for the crown, with the exception of prison post, that continued to be effected gratuitously till 1734.

During all this time, the institution regarding country-inns had been the object of several ordinances. In 1561, a tax was imposed for the establishing of country-inns, where horses should be kept in readiness to be hired against a fixed tax by those travelers who were not entitled to be conveyed by transport for the crown. In 1584, it was enacted that the Constables should also be innkeepers; a tax was set down for victuals, fodder, etc., and exemption from taxes on his farm was granted to the innkeeper. In 1593, a stated fee was for the first time prescribed for all wayfarers. During the 17th century, the erecting of country-inns at distances of 2 Swedish miles (about 13 Eng. miles) at most from each other was encouraged by granting several liberties and advantages to the owners, e. g. assistance from the hundred in building the house, parcels of land out of the commons, exempt from taxes; and the monopoly within a certain district of selling beer, wine, and gin. (It needs scarcely to be said that this system has long ago disappeared; concerning the present legislation as to sale of liquors, see under the heading Temperance Movement, p. 276).

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According to the inn regulations of 1734, the governor of the province had to decide where inns should exist, and the farms were bound to take the trouble of keeping them, against privileges set down by law (innkeepers' privileges). But at the side of this, **the duty of keeping a relay of post-horses** continued to be a considerable burden. As early as 1633, crown-tenants and farmers living out of the way, were enjoined to have horses in readiness at the innkeepers' (constables') during 4 days at a time (tenants of the Nobility only for 2 days). As soon as these horses were employed, notice was given for as many more as were needed to be sent from the people in the neighbourhood of the inn (so-called reserve post). In 1727, a trial was made to get the irregularity of this burden smoothed out by an agreement about a so-called post-law before the courts, which had to distribute the duties within its district according to settled principles. In general, the hire no doubt was too small a remuneration for the trouble of keeping post-horses, for which reason the displeasure and the complaints never ceased. At last it was begun in 1810, when possible, to put up the work to *contract*, by which horses should be held in readiness against a higher pay and with a subvention of public means. As a rule, the innkeeper himself or a peasant living quite near the inn became the contractor; but when the number of horses he had undertaken to keep were employed, the obligation of the farm-owners to provide reserve horses when wanted, came into force.

By the **Law of 1878** about posting, the soil has nearly altogether been delivered from the »burden». The hire per mile is stipulated for each Län by the State Government (after proposal of the Governor and the County Councils), but in case, at the Dutch auction, the lowest amount for which a solvent contractor undertakes to keep post-horses prove larger than the hire, the State pays half (in certain cases somewhat more) and the County council grants the rest, which latter contribution is rated, not only on the landed property that formerly had to bear the posting burden alone, but also on other property and income. However, by lowering or refusing the contract contribution demanded when finding it too high, the County council can occasion a return to the old system of reserve post. Further, the law in question annulled a great many dispensations from partaking in the posting that had been granted to several kinds of farms, benefices, and functions. Nevertheless, the duty still partly remains of transporting for the crown against a stipulated payment, differing in times of war from times of peace as also varying for different kinds of farms. However, this burden nowadays occurs only exceptionally, as the rather numerous railway lines of our country less and less necessitate posting for private people and still less for military purposes. — Of the lessened extent of public posting, the figures below bear witness; they show the annual number of post horses sent out during the quinquennial periods of 1856/1900:

1856/60 948,000	1871/75 585,084	1886/90 204,124
1861/65 621,309	1876/80 379,234	1891/95 232,280
1866/70 416,245	1881/85 255,853	1896/00 316,212

During the last two periods the number has increased again. The cause of the decrease may in several places be the high posting rates, in consequence of which it will sometimes prove cheaper to hire private horses.

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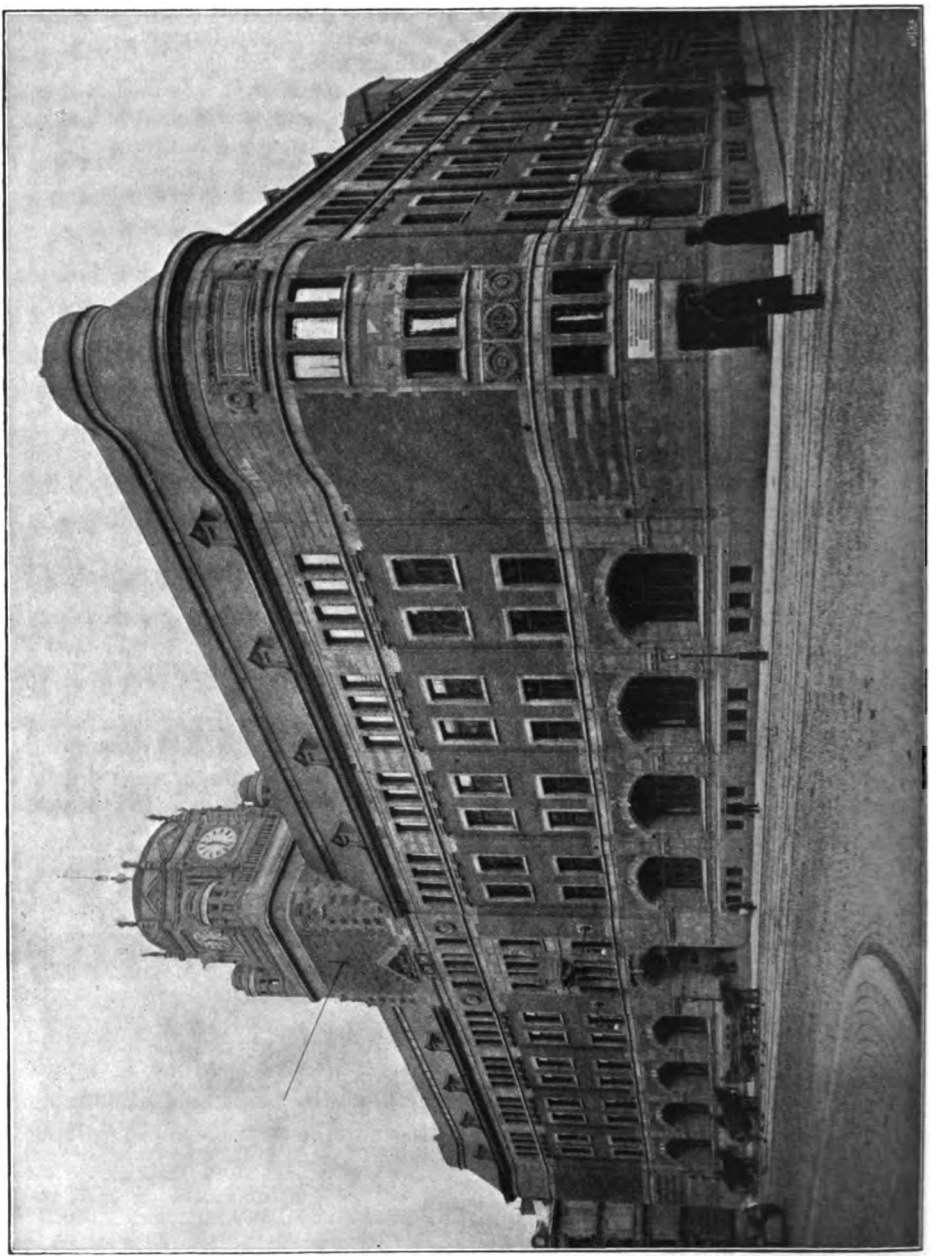

General Post Office, in Stockholm.

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4. POSTAL SERVICE.

The Swedish Post Office is one amongst the oldest in Europe. It dates its beginning from February 20, 1636, upon which day the Regency under Queen Kristina issued a Royal ordinance according to which certain farms, lying near the high-ways, were bound to attend to the conveyance of the mails, against freedom from a number of public burdens and, later on, the receipt of some payment from the P. O. funds.

At the distance of every two or three Swedish miles (13 à 19 Eng. miles) was stationed a post-farmer who was obliged to have in his service two post-servants, and who, either personally or by these latter, had to convey the mail to the next post-farmer. During the first few years of postal service, foot-messengers were exclusively employed. As early as 1645, however, mounted messengers are mentioned; mail-cart service came into use later on. The mails were conveyed once a week between Stockholm and the southern, western, and northern localities. Arrangements were also made, by the establishment of a sea-post, for the maintenance of postal communications with the Baltic Provinces and foreign contries. From 1662 we find a number of the more important mails of the country increased to bi-weekly ones. It was not till 1810 that the mail-service between Stockholm and Gothenburg was extended to four trips per week, and fifty years later the point was finally reached — partly by having recourse to railway facilities — of being able to arrange a daily despatch of mails between the capital and the second city of the Kingdom. The number of post-offices amounted during the first years to no more than 29, but had in 1668 increased to 78. — At first the postage was always equal — 2 öre silver (corresponding to about 16·6 öre of present Swedish currency = 2 1/2 pence) — but it soon became graduated.

Remarkably enough, the postal institution was favoured and protected to a high degree during the reign of Charles XII. In 1704 an instruction was issued from the head-quarters at Yaroslav to the Direction of the Post Office Department, an instruction whose regulations were only replaced 159 years later by those of the Instruction for the present General Post Office. An Instruction for Postmasters, issued in 1707, and which was in many respects of merit, has also, in certain of its chief features, remained in force until our times. During the last years of the reign of Charles XII, a royal ordinance was issued by which the postal service was joined to the system for conveying passengers, the inns thus becoming stages. Six different kinds of mail-services were established, viz. permanent post, parcel post, driver-post, runner-post, mounted post, and extra post. The great plan for the development of the postal service intended by the royal ordinance mentioned, which was, in many respects, before its time — was never carried out, for, after the King's death, it was determined that matters should remain as they were before. Then followed a pretty long period of stagnation in the development of the Swedish Post Office.

From 1820 we have to note the introduction of a special postage for newspapers* which, however in 1824, was exchanged for a fixed duty, according to

* Until 1685, the Post Office had not only to convey, but also to — compile the »Ordinary Postal News». After that date exemption from postage was granted to the official papers, and, a little later on, to some few other privileged papers, too. It was not till 1820 that the Post Office, to any greater degree, took over, the spreading of newspapers, upon payment of a certain postage.

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the size of the paper: to control the payment of this tax a special revenue stamp was introduced, with which every copy of a newspaper had to be marked. In 1830 a regulation was issued that either contracted post or inn-post should be employed instead of the farmer-post for the conveyance of the mails on several new postal lines established at that time. In the same year, the rate of inland postage was thoroughly revised, the basis for the new rate being, not as before, the number of post-offices a letter had to pass, but the distance between the place of posting and that of destination; by this means a complete zone-tariff was instituted, with eleven different rates of postage. In 1849 regulations were issued for the conveyance by post also of articles with declared value. July 1, 1855 is a day of note in the annals of the Swedish Post Office, for on that day was introduced the uniform inland postage for letters of a certain weight, without respect to distance. Simultaneously with this was also introduced the use of postage-stamps and of fixed letter-boxes. At the same time, the Riksdag gave permission to apply the future possible surplus on the income of the Post Office to the extension and improvement of the latter. At the beginning of 1861 were established the so-called *postal stations*, post-offices with limited competence and subordinate to a *head post-office* (postkontor). In 1863, a complete *postal car*, the first traveling post-office of the country, was placed upon the state-railways. In 1866 money orders, and the system of forwarding articles marked with trade charges (value payable articles) came into use, while inland book-post came into existence in 1864, after foreign book-post having long been in operation.

The period (1867/89) during which the Swedish Post was under the direction of *A. W. Roos*, was one of great importance for our postal system. Amongst notable improvements made under his administration the following may be mentioned: In 1869 the postage for letters to Norway and Denmark was reduced to the same amount as for inland correspondence; in 1870 all the post-farms still in existence were freed from the obligation of attending to the conveyance of the general mails; in 1872 the stamp-duty for newspapers was exchanged for a postage in accordance with the subscription prices; in the same year stamped envelopes and post-cards were introduced and the insurance system was reorganized; in 1872 the first Post Office Hand Book, containing the principal Regulations, Rates of Postage, etc., was issued; in 1873 the franking privilege, which had been granted to certain authorities and officials, was withdrawn; in the last-named year, too, the »letter-carrying for the Crown», a burden laid upon certain farms to transport official letters, came to an end, a great number of new postal lines and post-offices being gradually established to replace this method of letter-carrying; in 1877 a beginning was made to facilitate, by means of rural postmen, the interchange of correspondence in country districts; and, in 1882, the delivery fee to postmen was abolished. — During this period it was, too, that the Universal Postal Union was formed (1875).

During the last decade we note: the compilation and completion, by means of special *regulations* and *instructions* (from 1892), of the rules in force respecting the different branches of the postal service, in order to secure stability and uniformity in its working; the division, from 1893, of the whole country, with the exception of the towns of Stockholm, Gothenburg, and Malmö and their nearest vicinity, into five postal districts, each placed under a *postal inspector* authorized to act as an intermediate authority between the central administration and the *postmasters*, as the heads of the post-offices are now called, save those in the three towns just mentioned, who are called *postal directors;* and finally, the publication of a new Post Office Hand Book (1899).

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TABLE 157. *Postal service. Revenue and expenditure.*

Average for the years	Thousands of kilometers covered by the mails.				Revenue and expenditure. Kronor à 1·10 shilling.		
	On high-road.	By railway.	By water.	Total.	Revenue.	Expenditure.	Surplus.
1866/70.....	5,727	2,504	·	·	2,214,758	2,112,736	102,022
1871/75.....	6,294	3,973	·	·	3,214,234	3,116,157	98,077
1876/80.....	6,858	7,710	4,319	18,887	4,725,803	4,715,361	10,442
1881/85.....	6,131	10,221	5,364	21,716	5,821,974	5,146,638	675,336
1886/90.	6,764	13,206	6,444	26,414	6,656,773	6,427,723	229,050
1891/95.....	7,184	16,045	7,243	30,472	8,013,648	7,457,182	556,466
1896/00	7,831	19,543	6,859	34,233	10,411,164	9,470,849	940,315
In 1900.....	8,738	21,670	6,485	36,893	11,883,965	11,218,836	665,129
» 1901.....	9,292	22,739	6,455	38,486	12,842,134	12,205,749	636,385
» 1902.....	9,589	23,522	6,356	39,467	14,007,635	13,138,069	869,566

The Swedish Post Office of our days is considered, on the whole, as occupying a fairly high position in technical and administrative respects. Its development during the last few decades is given statistically in Tables 157—159.

The length of *postal lines*, with regular highroad or railway service, increased between 1868 and 1902 from 19,835 kilometers to 44,970 kilometers, viz., the highroad lines, from 18,250 kilometers to 32,885 kilometers, and the railway lines, from 1,585 km. to 12,085 kilometers. To this may further be added the steamer lines, whose length it is more difficult to calculate, but which was estimated, in 1902, at 14,265 km. With this addition, the total length of postal lines amounted, in the year named, to 59,235 km., a figure which may be remarked by the way pretty nearly to coincide with the total length of all the roads of the kingdom. — The number of *kilometers covered by the mails* is shown by Table 157. As will there be seen, nowadays no less than 60 % of the total number of kilometers covered fall to the share of the railroads, 16 % to transport by water, and but 24 % to the high road-post.

The fixed or stationary *post-offices*, which still in 1815 amounted to but 109, and in 1861 were 248, increased in number to an extraordinary extent during 1874 and 1875 (cf. the historical summary given above), running up in these two years from 576 to 1,844. At the close of 1902 there were in the country 2,819 fixed post-offices, of which 191 were *head post-offices* and 2,628 *postal stations*. At the date last mentioned there were, besides, in activity on the railway lines 274 traveling post-offices, of which 112 were managed by *postal clerks* (post coupés), and 162 by *subaltern officials* (postilion coupés). On the steamer postal lines the public were served, during the sailing season of 1902, by 153 *steamboat post-offices*, intended, as a rule, only for the transmission of ordinary letters, post cards and parcels, besides which, on the Packets, keeping up communications on the

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TABLE 158. *Letters, parcels, etc., mailed.* In millions.

Average for the years	Ordinary letters, parcels, etc.			Valuables.			Total.		
	Inland.	International.*	Total.	Inland.	International.*	Total.	Inland.	International.*	Total.
1876/80	48·59	7·54	56·13	2·63	0·46	3·09	51·22	8·00	59·22
1881/85	65·96	11·94	77·90	3·38	0·68	3·96	69·29	12·57	81·86
1886/90	92·28	16·52	108·75	4·11	0·82	4·93	96·34	17·34	113·68
1891/95	124·80	20·22	144·52	5·71	1·01	6·72	130·01	21·23	151·24
1896/00	200·93	24·48	225·41	8·14	1·35	9·49	209·07	25·83	234·90
In 1900	235·11	27·99	263·10	9·24	1·48	10·72	244·35	29·47	273·82
» 1901	258·24	31·75	289·99	10·00	1·66	11·66	268·24	33·41	301·65
» 1902	292·18	30·40	322·58	10·82	1·63	11·95	302·50	32·03	334·53

sea post-line Trelleborg—Sassnitz, there was a special *sea post-office* at work.

Of the 2,819 *fixed post-offices* existing in 1902, there were 515 in the five northern Läns, 274 in the Läns of Kopparberg and Vermland, 476 in the remaining districts of Svealand, 1,199 in Götaland, Skåne not included, which last-named province had 355. Thus, per thousand sq. km., there existed in these five divisions of the country, 2·0, 5·6, 13·3, 14·7, and 31·5 fixed postal establishments. These relative figures are, of course, highest for the Län of Malmöhus (40·2), and lowest for that of Vesterbotten (1·0). The average for the whole kingdom was 6·4.

The development of *postal traffic*, with regard to the total number of letters and parcels, etc., dealt with, is shown by Table 158. For the quinquennial periods 1876/1900 the average number of postal packets per head of the average population amounted to 13, 18, 24, 31 and 47 annually: for 1902 the figure was 64. Compared with that of the rest of Europe, the postal traffic of Sweden, in relation to the population takes, perhaps, a middling position — being, on the one side, much higher than that of East-European countries, but on the other hand, by no means reaching the heights attained by that of the great industrial and commercial nations, for it is a matter of general observation that to a highly-developed commercial life, in the first place, the increase of postal traffic is due. — In the city of Stockholm the total number of letters, etc., delivered in 1902, amounted to about 340 per head of the population. No less than 74 % of this number consisted of newspapers, the corresponding figure for the whole country being 53 %.

Of the total number of letters, parcels, etc. passing through the Post Office in 1902, there were 95·27 mill. ordinary letters, 41·28 mill. post-cards, 17·80 mill. book-post articles, 167·92 mill. copies of newspapers and magazines, 4·46 mill. registered articles, 2·05 mill. insured letters, parcels, etc., 1·01 mill. articles with trade charges, 3·48 mill. money orders, etc. The conveyance of newspapers by post presents an enormous growth; in 1868 the number of copies was but 5·75 millions, but amounted in 1902, as we have seen, to 168 millions. — From a

* Letters, parcels, etc., arrived and dispatched, together.

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TABLE 159. *Letters, parcels, etc., of value.* Total amounts.

Average for the years	Articles insured.[1] Kronor.	Articles with trade charges.[2] Kronor.	Money orders.[1] Kronor.	Total. Kronor.	Subscription money.[3] Kronor.
1866/70.....	285,262,297	18,488	1,275,477	**286,556,262**	519,038
1871/75.....	414,927,636	112,242	2,471,785	**417,511,663**	871,991
1876/80.....	600,574,206	348,177	4,974,421	**605,896,804**	1,062,854
1881/85.....	684,790,151	1,285,249	10,412,696	**696,488,096**	1,172,104
1886/90.....	807,663,169	2,114,430	14,467,256	**824,244,855**	1,414,820
1891/95.....	927,994,432	3,109,493	24,227,347	**955,331,272**	1,738,851
1896/00.....	1,130,488,963	5,591,726	46,089,775	**1,182,170,464**	2,303,886
In 1900.....	1,224,970,722	7,164,695	68,229,396	**1,300,364,813**	2,652,886
» 1901.....	1,251,378,528	7,964,888	78,775,163	**1,338,118,579**	2,805,326
» 1902.....	1,178,108,412	8,922,617	86,654,356	**1,273,685,385**	2,878,506

statistical point of view we must remind the reader that, as regards the number of letters, parcels, etc., the articles are as a rule counted but during one week of every year, the annual figures being then obtained by multiplication.

The revenue and *expenditure* of the Post Office from the beginning of 1866 is shown by Table 157. As may there be seen, the revenue gives a surplus, even if it be to no very great amount. In most other countries, too, the revenue and expenditure of the Postal Departments usually pretty well balance each other: the English Post Office distinguishes itself by a large net profit, while, on the other side, the American suffers from a serious deficit.

As regards the **administrative** side, it may be mentioned that the supreme direction of the postal system of Sweden is in the hands of the *General Post Office*, which consists of a Postmaster General as chief, and — including a representative for the Post Office Savings Bank — of six other members. The permanent staff appointed at the General Post Office numbers at present 41 officers, besides which the Board is aided by 1 assistant for matters concerning the mail steamers, and about 60 unestablished clerks. In the different divisions of the Board there are 7 permanent and 7 extra porters, with fixed wages.

The number of persons employed *in postal district administration, at the fixed post-offices or on the postal lines*, amounted at the close of 1902 to 8,070, amongst whom may be reckoned: 3 postal directors, 5 postal inspectors, 188 postmasters, 4 managers of united post- and telegraph offices in Stockholm and Gothenburg, 34 controllers, 500 clerks, 1,163 auxiliary clerks (of which number 149 were temporary assistants, receiving no salary), 2,628 managers of postal stations, 1,050 established, 703 extra, and 661 reserve postmen, 968 rural postmen and, for the sea post, 11 persons for winter service, and 153 managers of the steamboat post-offices.

[1] Inland and *for* abroad. — [2] Inland and *from* abroad. — [3] Money of subscription received by the Post for the account of newspapers and periodicals.

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To obtain a place as official at the district administration or in the practical service of the Swedish Post Office, the applicant is required to have matriculated or to have, at least, certificates of an equal knowledge in Swedish, one foreign language, geography and mathematics, and to go through a six months' *course of training*. During this course, the pupils must spend three months at a post-office, to be fixed by the Central Postal Administration, in order to acquire practice in post-office work, and three months for theoretical postal studies at one of the post-offices in Stockholm, Gothenburg, Malmö, Sundsvall or Örebro: after the close of the theoretical course the pupils are examined in presence of censors appointed for the purpose. — About 400 *women* are employed at the post-offices; of the number, 2 are postmasters, about 240 managers of postal stations, and the rest are post-office clerks or auxiliaries.

5. TELEGRAPH SERVICE.

The first **signal telegraph** (semaphore) in Sweden was erected in 1794. In the autumn of that year an **signal** telegraph, constructed by A. N. Edelcrantz, was tried between the royal palace of Stockholm and that of Drottningholm, 10 kilometers (6 Eng. miles) distant.

The telegraph erected — almost simultaneously with that of Chappe in France, but on an independent system — proved so practical that, during the years following, new telegraph lines were established between Stockholm and various important points at the sea-entrance to the capital, as well as at several places on the west and south coasts of the country. The constructions mentioned, which to a great extent were brought about by the necessity, during the war of 1808 and 1809, of a quick and secure signal-service, fell into decay, however, at the end of the war. It was only in 1836 that the government determined upon their re-erection: a telegraph-corps was established, under the command of the chief of the Topographical corps, and received its regulations in 1838.

The subsequent development, of the signal telegraph was, however, of very short duration, in consequence of the discovery of the incomparably greater capability of electricity to convey communications quickly and safely, to great distances. After the introduction of the electric telegraph, the signal telegraph stations were, by degrees, done away with, and at present there remain but three of them.

The first **electric** telegraph line in Sweden was set up in 1853 between Stockholm and Uppsala, after which, during the two following years, new lines were put up from Uppsala, through Vesterås, Örebro, and Venersborg, to Gothenburg; from Stockholm through eastern Sweden to Malmö, and from Malmö to Gothenburg. As early as 1854 Sweden was placed in telegraphic communication with the continent by a submarine cable in the Sound.

The Swedish telegraphs in 1856 received a more permanent organization by the establishment of the *Royal Telegraph Department*, to which were entrusted not only the electric, but also the signal telegraphs. More or less thorough changes have, time after time, been made in this

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TABLE 160. *Telegraph service, revenue and expenditure.**

Average for the years	Paid messages.				Messages not paid.	Revenue.	Expenditure.
	Inland.	Foreign terminal.	Transit.	Total.		Kronor.	Kronor.
1861/65	160,474	53,328	21,974	**235,776**	·	578,830	508,481
1866/70	320,995	136,153	54,154	**511,302**	·	707,920	652,486
1871/75	546,913	247,332	67,599	**861,844**	·	1,105,777	911,125
1876/80	574,377	301,868	79,088	**955,333**	42,707	1,241,655	1,201,572
1881/85	608,632	425,316	135,861	**1,169,629**	45,957	1,334,238	1,256,810
1886/90	723,694	539,550	175,509	**1,438,753**	57,677	1,359,451	1,285,079
1891/95	940,855	692,710	224,743	**1,858,308**	92,621	1,432,240	1,386,847
1896/00	1,109,001	842,361	328,380	**2,279,742**	165,117	1,707,220	1,420,952
In 1900	1,252,848	889,216	364,255	**2,506,319**	243,164	1,846,774	1,513,471
» 1901	1,293,912	912,654	472,871	**2,579,437**	234,393	1,891,281	1,570,078
» 1902	1,237,905	971,375	347,043	**2,556,323**	226,428	1,858,142	1,586,396

organization, partly in consequence of an increase in the use of telegraphic communication (this was especially the case after the reduction in the charge for telegrams, in 1889) and partly — and chiefly — in consequence of the immense development of the telephone system during the last decades of the 19th century.

The *telegraph net of the Department*, at the close of 1902, extended to 9,566 km. of lines and cables, and to 29,116 km. of wires. Besides this, there are telegraph lines running along all the railways, intended, in the first place, for the use of the railways themselves, for the direction of the traffic, but also, as a rule, employed in forwarding telegraphic despatches from the public. The Telegraph Department runs wires on about half of these pole-lines, which are kept up in common by the Department and the railways in question, and the length of which is included in the figures given above.

The *railway telegraph net*, at the close of 1902, extended to 7,486 km. of lines independent of those of the Telegraph Department, and to 23,014 km. of wires: thus *the total length of the telegraph net of the country*, at the date mentioned, amounted to 17,052 km. of lines and cables, and 52,130 km. of wires.

The number of *telegraph offices*, at the close of 1902, amounted to 181, of which number 4 had day-and night service; 109 had all-day service, 61 had partial day-service, and 7 were state telephone offices with complete telegram service. If to these we add 364 telegraph offices on the state railways, and 1,074 on the private ones, the total number of telegraph offices amounts to 1,619.

To satisfy the public need of connection with the telegraph-net, so-called *telegram rooms* have been arranged, both at telephone connecting-stations, and at private subscribers' in the country, from whence the telegrams handed in are telephoned to the nearest telegraph office,

* Railway telegraphs not included. — A krona = 1·10 shilling = 0·268 dollar.

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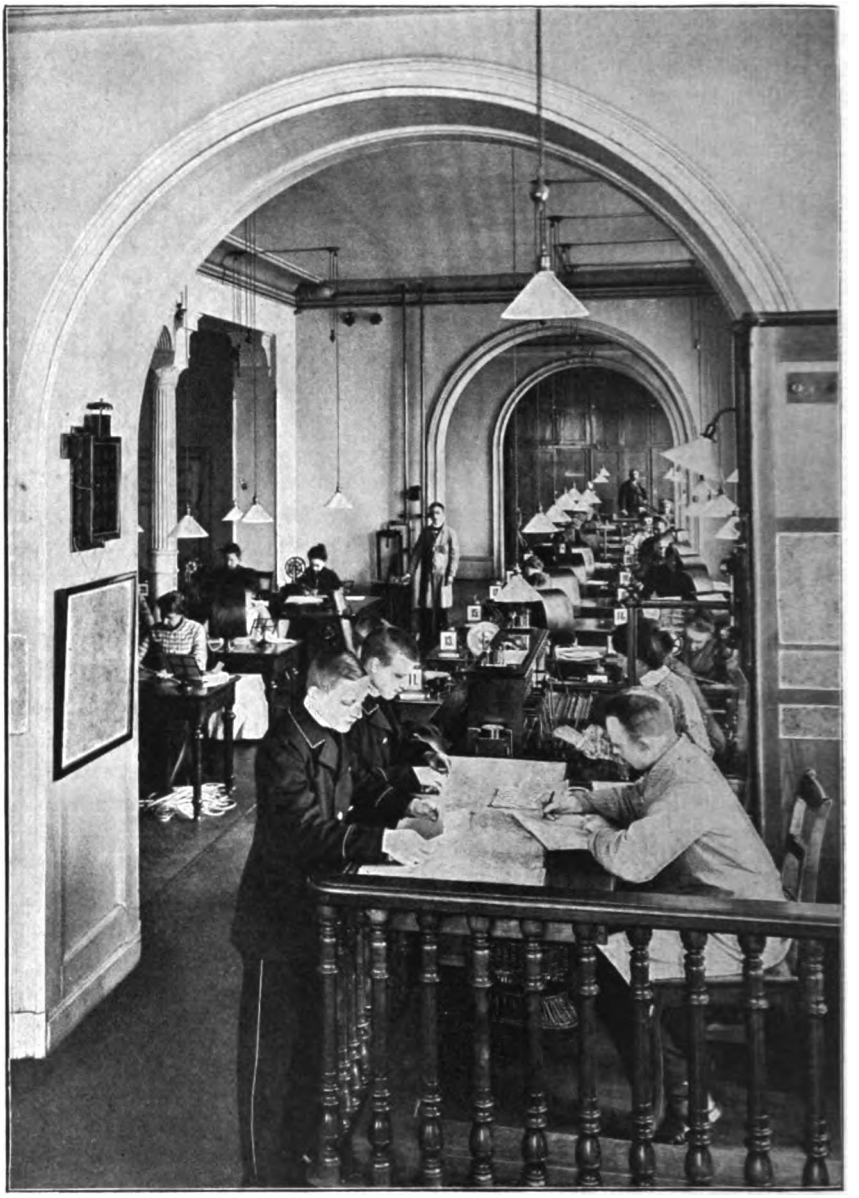

Morse-division of the instrument room at the Central Telegraph Station in Stockholm.

and telegrams received are sent to their addressees. In certain towns there are also *telegram receiving-rooms*, intended only for telegrams to be despatched, which are sent on, by means of telephone, to the central telegraph office of the town.

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The number of telegram rooms, at the close of 1902, amounted to 555, and that of the telegram receiving-rooms to 82; thus the total number of offices where telegrams are received for transmission then amounted to 2,256.

As regards the *transmission of telegrams*, it may be mentioned that, during 1902, the *number* of inland telegrams amounted to 1,237,905; of foreign, terminal telegrams from Sweden to abroad, to 452,065, and to Sweden from abroad, to 519,310; and of transit telegrams to 347,043; or, altogether, to 2,556,323 paid telegrams. Free telegrams (official and meteorological) were transmitted to a total of 226,428, of which 163,339 were official, and 63,089 meteorological. The number of paid telegrams which only passed over the railway telegraph lines amounted, in 1902, to 133,445. Thus *the total number of paid telegrams*, from or to Swedish telegraph stations, amounted to 2,342,725, to which must be added the 347,043 which, via Sweden, were transmitted between foreign countries.

The *telegraph fees received* by Sweden for the telegrams sent by the Telegraph Department in 1902, amounted to 1,817,482 kronor, other receipts of the department came to 40,660 kronor. As the expenditure amounted to 1,586,396 kronor, there was, for that year, a surplus on the income of the Telegraph Department of 271,746 kronor.

The Telegraph Department, which until April 1, 1900, subordinated to the Minister of Finances, was from that date placed under the Home Department. The departmental *Board* consists of a chief, with the title of director general, who has the sole right of decision, and four directors (one for the administrative division, one for the line, one for the telegraph traffic, and one for the telephone traffic division). Matters of current business are decided by the directors, each in his department. The staff is completed by 22 permanent officials and clerks, 14 auxiliary clerks, and 14 other unestablished assistants, the whole staff of the Board being 55 officers.

The *telegraph office staff* at the close of 1902, consisted of 4 directors, who are chiefs of the four offices (Stockholm, Gothenburg, Malmö, and Sundsvall) which have day and night service; 66 commissioners, and 312 telegraphists (whereof 106 males, and 206 females). Offices with all-day service are directed, as a rule, by commissioners; offices with partial day-service exclusively by female telegraphists. Thus the total permanent staff amounted to 382 persons. The unestablished office staff amounted to 90 male telegraphists and 347 female ones. The whole staff at the telegraph offices thus amounted to a total of 819 persons (266 men and 553 women). The total number of telegraph messengers and porters at the offices, was 319 in all.

In order to be accepted as a telegraphist, the applicant must have passed the final examination of a Higher State College — the university entrance examination on the scientific line — or must prove himself or herself to be in possession of a corresponding amount of knowledge, and, moreover, must have gone through a four months' *course of training* at the school of the Telegraph Department in Stockholm.

For the *supervision* of the telegraph and telephone service at the stations, the whole country, with exception of the towns of Stockholm, Göteborg, Malmö, and Sundsvall, is divided into four traffic districts, each with a telegraph inspector at the head.

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For the *erection and maintenance* of the telegraph and telephone nets Sweden is divided into 6 line-districts, in the hands of 6 line-directors. In 1902, 700 men were employed during the winter months, and about 900 men during the summer months for erection and repairs.

The Telegraph Department has its own *workshops* in Stockholm for the manufacture and repair of telegraph and telephone parts, the number of hands (in 1902) being about 234.

6. TELEPHONE SERVICE.

Sweden has always stood her ground with other countries, in regard to the technics of the telegraph system just described, but, from one reason or another, it has never reached any high standpoint in extension and use of the telegraph. But as to the *telephone*, Sweden has not only adopted all the improvements made in the system — in many cases originating them herself — but, in a quantitative respect, has effected such a development that the telephone system in Sweden has for many years been of greater extent, relatively to the population. than that of any other country in the world.

Sweden's superiority in this respect was for a long time very decided. During the last few years, however, the growth of the telephone has not been so great here as during previous decades. It is true that the state telephone has been extended, but this has greatly been occasioned by the purchase of private nets, besides which all development of private telephone activity outside Stockholm and its environs has ceased. In consequence, a couple of countries have gained upon Sweden in respect to the relative number of telephone apparatus, and possibly is Sweden now distanced by the United States.

At the close of 1903, there were in Sweden about 103,000 *telephone apparatus* in use, or about 198 for every ten thousand inhabitants. As the figures for other countries are one or two years older, it cannot be safely determined whether Sweden still occupies the first place, but it may be said with certainty that it competes with the foremost, and that most other countries exhibit figures which are *far* below the Swedish. The average figures for Europe scarcely amount to 25 apparatus per ten thousand inhabitants, and even Great Britain and Ireland and Germany, which possess widely extended telephone communications, come to but about 60, or less than one third of that in Sweden.

The telephone service in our country commenced in the form of *private* telephone companies, of which, however, the greater number were persuaded to sell their lines to the *State* after it had itself begun to set up telephones. The largest of the private companies, or the Stockholm General Telephone Co., Ltd., still remains, however, within its domain, a competitor of, and one fully as strong as the State telephone

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service, and it is, as a matter of fact, the mutual competition between these two establishments which to a great extent explains the wonderful development of the telephone in Sweden.

The first telephone net in Sweden was constructed in 1880 by the *Stockholm Bell Telephone Co., Ltd.* Almost at the same time were set up telephone nets in Gothenburg (1881), Malmö, and Sundsvall, and some other, smaller towns (in 1881, or the years immediately following). In order to facilitate communication between the government departments in the capital, another net was opened 1881 in Stockholm by the *State telegraph department*, which in 1882 set up telephones in Uddevalla and Hernösand, besides establishing several lines of communication between telegraph and private offices.

Simultaneously with these first installations and during the period immediately following, *private telephone associations* were constituted it may be said, at every place of importance in the country. These associations, which contributed greatly to the development of the Swedish telephone system, were formed, as a rule, by a larger or smaller number of persons in a town or a district which for its own part felt the need of telephonic communication. The capital necessary for the common exchange was contributed, apparatus, etc., were bought in common, but each member paid for that part of them which he used, and, as a rule, each one built and paid for his own line. The management was carried on, often free of expense, by a committee chosen from among the members of the association, and as each individual kept his line in repair, the annual fees, needed only for the maintenance of the exchange and its officials, were remarkably small.

In a number of larger towns, however, *limited companies*, with a view to profits, undertook the setting up, etc., of telephones. That the fees in these cases were considerably higher, was a matter of course, so much the more as greater demands were made upon these erections in regard to technical excellence.

The junction of the nets at various places came about when the technicalities of the system by degrees rendered conversation at greater distances possible. In most cases, the necessary capital was obtained by subscription, and no fee was demanded for conversation even on greater distances.

About 1890, the *private* telephone erections were calculated to have a length of 40,000 kilom. of line, and about 16,000 apparatus in use. At that period the *State* began to devote itself to telephone operations with greater energy. At the close of 1903 the state telephone system had about 67,600 apparatus in use, the telephone companies of Stockholm 34,800 apparatus, and other private companies possibly about 1,000 — the last named figure being, however, uncertain. The total number of telephone apparatus in all countries scarcely amounts to 4 millions, so that Sweden, with its 103,000 apparatus, possesses between 2 and 3 % of the whole. The total length of line in Sweden may be calculated at about 200,000 kilom., constituting a proportion of about 2 km. line to every apparatus, which is the same as in several other countries.

The State Telephone.

As we have mentioned before, the State had set up telephone nets, even if but on a small scale, as early as in the first half of the eighties. In 1883 and 1884, the State bought two of the largest systems in southern-

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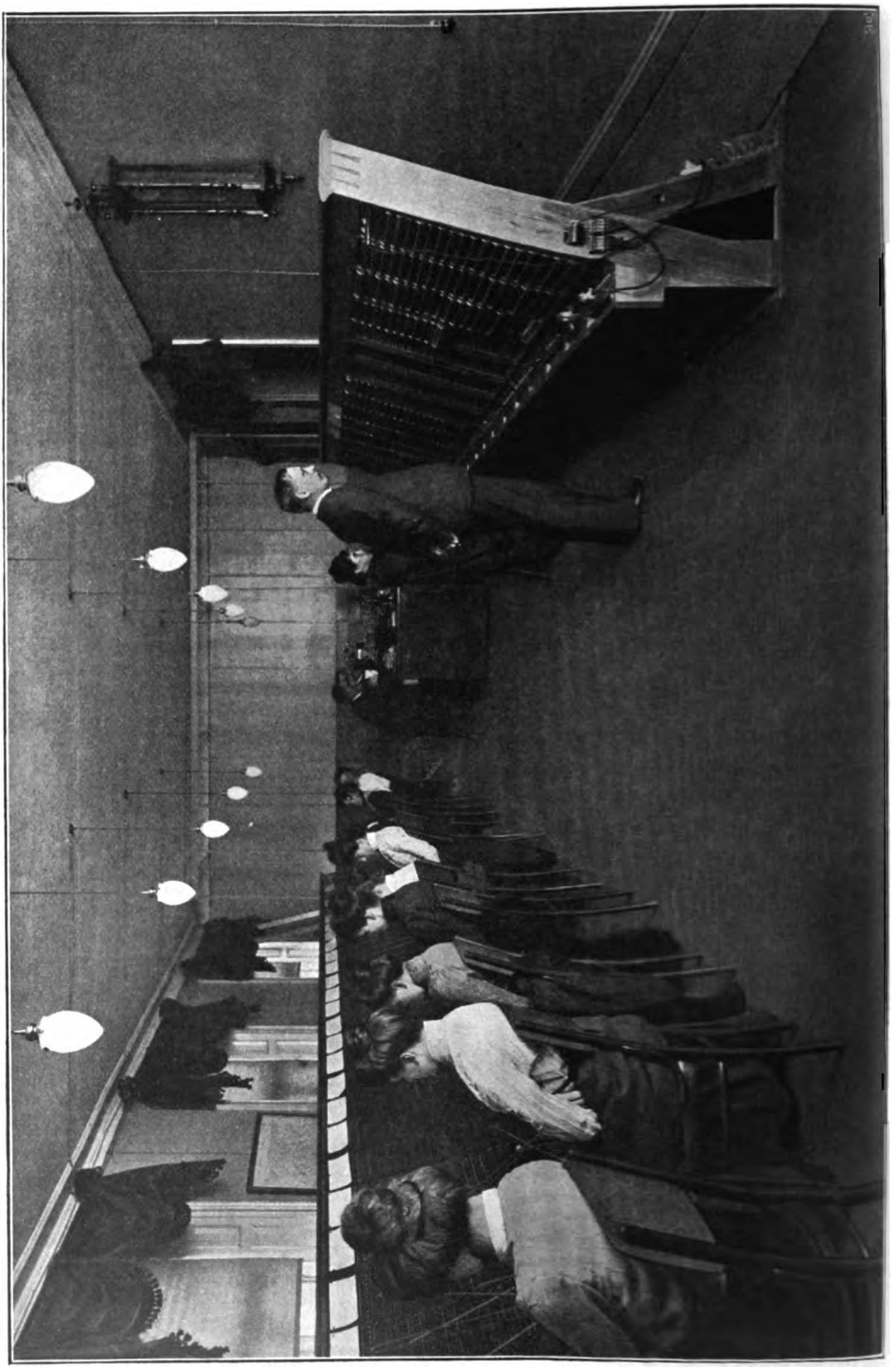

Call distributing boards at the State Telephone Exchange of Stockholm (Dec. 1, 1915.)

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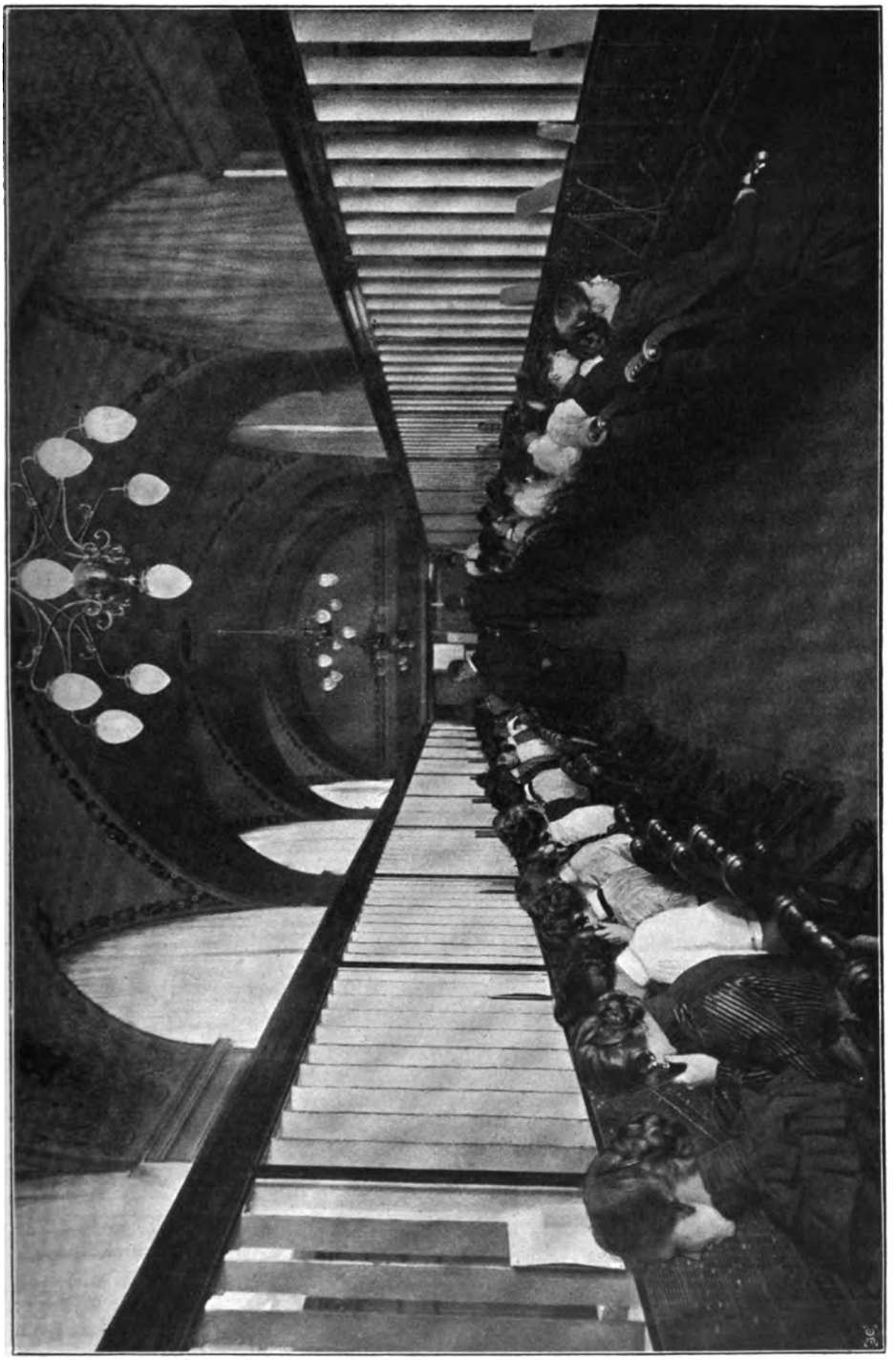

The answering boards, at the State Thelephone Exchange of Stockholm. (See p. 1015.)

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most Sweden, and these became the starting-points for fairly large telephone nets in that part of the country. In order to support the fishing industry, which at this time began to flourish in western Sweden, the State, partly with aid from the local authorities, also there erected widely spread telephone communications.

It was, however, not till the question of carrying on conversations at *long distances* was technically solved that the activity of the State became more energetic. In 1889 the first long line of communication, that between Stockholm and Gothenburg, was opened, representing a distance of 500 kilom., and, in the same measure that several similar long lines were constructed by the State, also the local nets came into its possession, partly by purchase, partly by new erections, not only along the chief highways but also in more remote parts of the country, — which nets, by means of lines of lesser length, were brought into connection with the trunk lines between the large centers.

Between 1890 and 1903, the State telephone net grew from 126 exchanges to 1,231. The total number of apparatus has simultaneously increased from 4,950 to 67,620, and the length of line from 12,780 to about 140,000 kilometers.

Respecting the *fee* paid by private persons for telephone communication, it amounts in most places to 50 kronor (2 £ 15 *sh.*) annually, to which must be added an entrance fee of 50 kronor, once for all. In a number of places the fee is, however, somewhat higher, but is there usually reduced after five years' subscription. No annual fee is charged for conversations on the long lines, but the right to their use is free to every subscriber upon payment of a special fee, consisting of the following amounts calculated upon the real length of the lines of communication: up to a distance of, at most, 100 kilometers, 15 öre; then to 250 km. at most, 30 öre; to 600 km. at most, 50 öre; then to 800 km. at most, 75 öre; to 1000 km. at most, 1 krona; to 1,200 km. at most, 1 kr. 25 öre; to 1,400 km. at most, 1 kr. 50 öre; to 1,600 km. at most, 1 kr. 75, and, for greater distances, 2 kronor, all for a conversation lasting 3 minutes. * For every following period of 3 minutes begun, the same fee has to be paid. *Express-conversations*, which have, by degrees, become more and more customary during business time proper, are charged double the ordinary special fee, and, on lines where no fee is paid for ordinary conversations, the ordinary special fee as given above. *Series-conversations*, that is to say, regularly recurring conversations which are carried on at certain hours, are charged as express-conversations, with an exception for *press series-conversations*, which pay the ordinary single special fee. A charge of 25 öre (3 1/3 *d.*) is made when sending for a person by special messenger for telephone conversation. In general, a special charge of 10 öre (1 1/3 *d.*) is made for conversations at public telephone stations. At certain exchanges, too, special charges are made for night conversations.

Progress in *technical* matters has been quite considerable, and some peculiarities of the Swedish lines deserve to be pointed out. All the lines, even those of subscribers, are double, and the State has avoided the system of having several exchanges in every district, so that even the most extensive local nets have the

* Thus, up to 62 Eng. miles 2 *d.*; then to 155 miles 4 *d.*; to 373 miles 7 *d.*; to 497 miles 10 *d.*; to 621 miles 1 *sh.* 1 *d.*; to 745 miles 1 *sh.* 5 *d.*; to 869 miles 1 *sh.* 8 *d.*; to 994 miles 1 *sh.* 11 *d.*; for greater distances 2 *sh.* 2 1/2 *d.*

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lines of all the subscribers running to one united exchange and being attended there. The »**Call-distributing-system**» invented by Mr. *J. A. Avén*, of the State Telephone in Stockholm, permits of a call being expedited by the telephonist for the moment *least occupied*, and has given very good results as the two greatest exchanges where it is used. Underground conduits of cement blocs — originally invented by Mr. *C. A. Hultman*, director of the State telephone exchange in Stockholm and afterwards introduced at several places abroad — are used to a great extent.

Till 1903, the Riksdag has voted money for the erection of the trunk lines, but for others, loans of public funds have been employed, obtained at the usual rate of interest, and to be sunk, as a rule, in a short period (12 years). The financial result of the telephone operations of the State is shown by the following figures. Since the beginning of the State telephone system up to 1902 inclusive, the gross receipts have amounted to 33,994,339 kronor *, of which 16,524,176 kronor were used for working-expenses, and 2,416,252 kronor have been paid as interest on capital. The surplus, 15,053,911 kronor, has been employed, partly to the amortization of loans (5,676,500 kronor), and partly to the extension of the telephone net (9,377,411 kronor).

From 1903 the State Telegraph and Telephone systems of Sweden have received a new organization. The main features of this organization are: that the telegraph and telephone services have been completely amalgamated, that the accounts for the two services are kept jointly, that the established staff has been considerably augmented, that loans of public funds are to be employed also for the construction of telephone *trunk* lines, that the loans are taken for longer periods (20 years, as a rule), and that the net profit of the telegraph and telephone service has to go to the Exchequer Department.

Private Telephone Companies.

We have already (p. 1010) spoken about the origin of these companies in Sweden, and how the greater number of them afterwards passed into the possession of the State. It now remains to give a short account of the largest and most important of the private companies still remaining, or those in **Stockholm.**

The private telephone lines of Stockholm are, at the present time, in the hands of two companies which work together, the Bell Company, previously mentioned, being the elder of the two.

The Bell Company was formed in 1880, principally with American capital, and used at first only American material. Its fees were pretty high (160 kronor in the City proper, 240—280 kronor in the rest of Stockholm *). The prices produced competition, and so the *Stockholm General Telephone Co., Ltd.* (Stockholms Allmänna Telefonaktiebolag) was formed in 1883, upon the initiative of

* A krona = 1·10 shilling or 0·268 dollar.

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H. T. Cedergren, C. E., a man deserving of exceedingly great praise for what he has done for the development of the telephones in Sweden. The fee of the new company for a private line was fixed at 100 kronor (£ 5½) for the whole of Stockholm (which was to be increased to 125 kronor (6 £ 18 *sh.*) when the number of subscribers reached 1,500). A still lower fee was rendered possible by the employment of an automatic switch apparatus, invented by Cedergren and the manufacturer *L. M. Ericsson* in Stockholm, by means of which several (as many as 5) subscribers, dwelling in the same neighbourhood, could have the same line to the exchange. The fee was then fixed at a minimum of 80 kronor. During the course of the next few years these prices by degrees were brought to their present low point (see below). Both companies continued to grow until 1885, when Stockholm was, both relatively and absolutely, the richest in telephones of any town in the world. After that time, the number of the subscribers to the Bell Company sank lower and lower until, at the close of the decade 1881/90, the General Telephone Co. purchased the greater number of its shares and, in 1892, the net of the Bell Co. was changed to a local system in a part of the town called Östermalm. In 1898, at whose close its subscribers in that district numbered more than 2,500, the Bell Co. purchased from the other company its plants for limited calls in other parts of the town, and it now seems to have a promising future before it.

The General Telephone Co. continued to increase rapidly. Already after about six years of activity, it had 5,000 subscribers and had managed, during the same period, to connect twelve country towns with the capital by means of the telephone, and, besides, carried on telephone operations in two more distant country towns — Söderhamn, with the surrounding district, and Jönköping. The company also entertained the idea of erecting long-distance lines to Gothenburg, Malmö, and Sundsvall, but the Government refused to grant concession to the application made in 1888. In return for a concession (for which, see below) received May 1, 1891, the company bound itself to sell to the state all the erections it had set up outside the district conceded to it of 70 kilometers in radius from the center of Stockholm, and not to carry on telephone business outside of this district.

During the whole period of its existence, the company has paid watchful heed to all inventions and improvements respecting the telephone and has introduced them into its telephone net with praiseworthy celerity. It began, for instance, already in the spring of 1884 (probably as the first in Europe) to employ the multiple-board, set up metallic circuit lines in a country town as early as 1888, and, during the years 1892/93, changed the whole of its great Stockholm net into a double-lined one. During 1889 the company applied for permission to lay down underground cables in the streets of the capital, but it was only in 1895 that it could begin with the execution of the work, which is now completed. By this means it will mostly be possible to avoid the damages occasioned to the telephone net time after time, by snowstorms, chiefly in Stockholm where the clusters of wires are very large. In 1891, an attempt was made to introduce a subscription of 10 kronor annually (11 shillings!) plus a fee of 10 öre (1⅓ *d.*) for each conversation *from* a subscriber's apparatus, but the attempt proved to be so economically unfavourable that it had to be abandoned after a couple of years.

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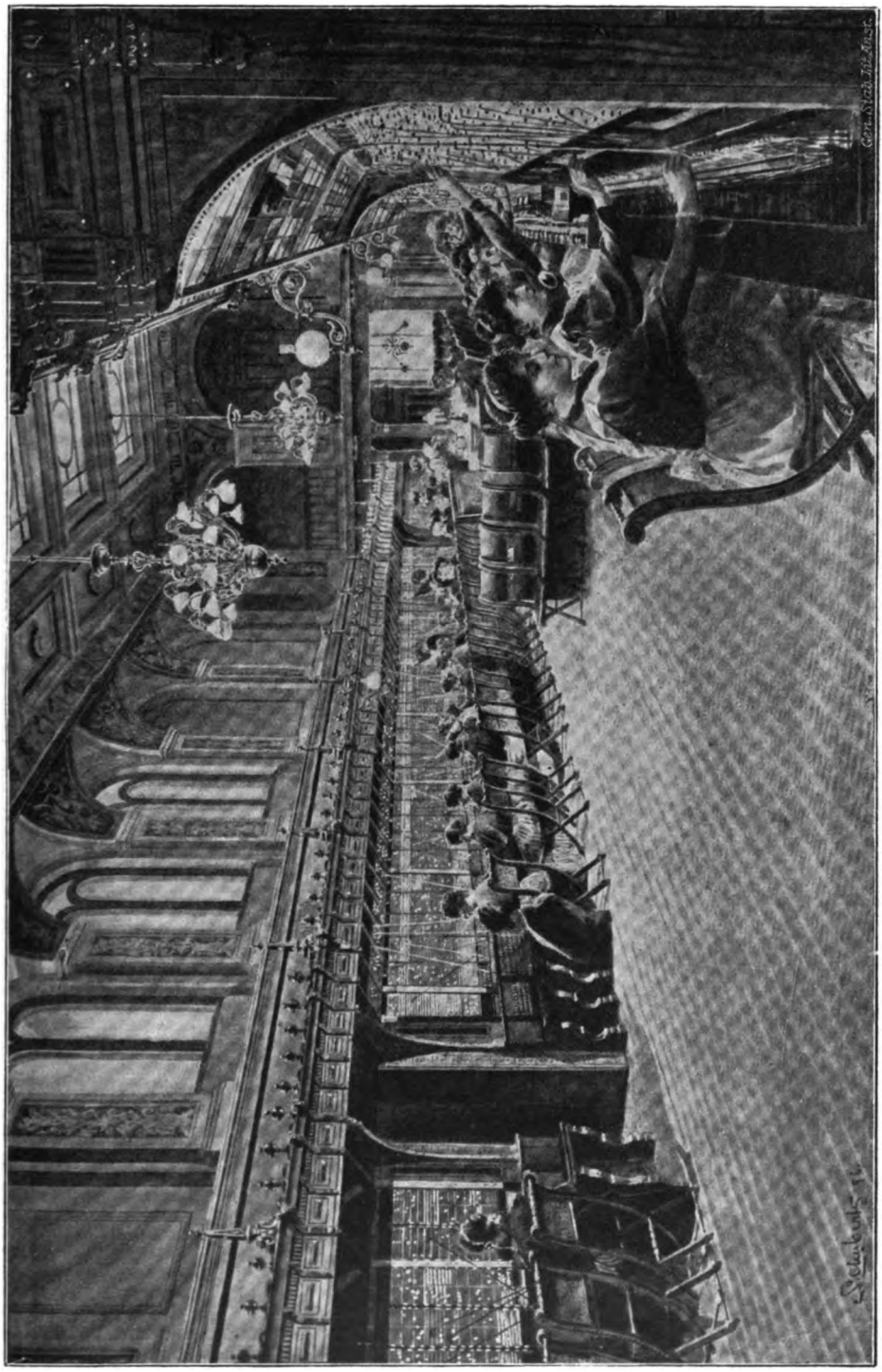

Expedition hall at the principal Exchange of the General Telephone Company of Stockholm.

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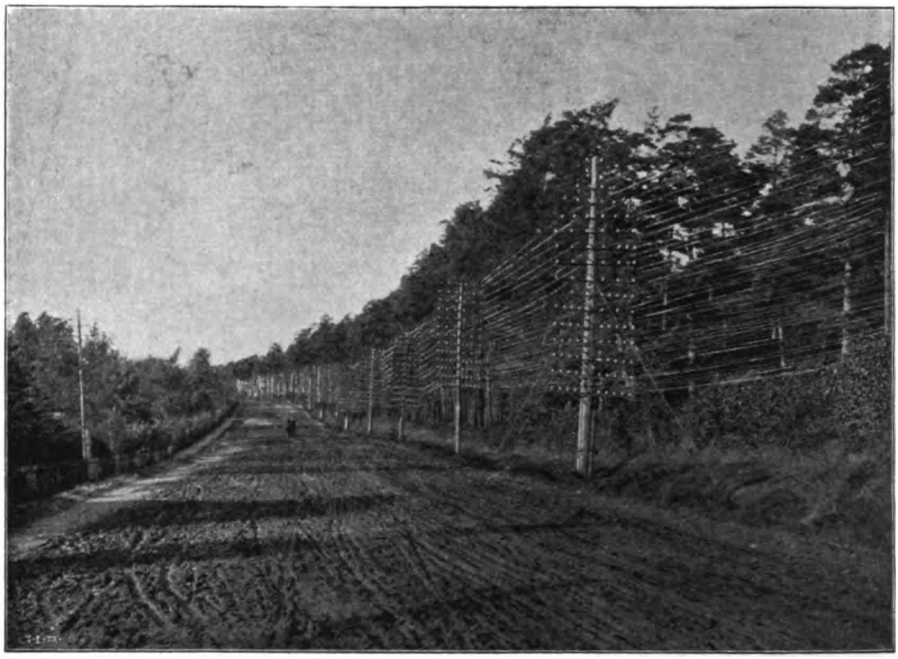

Rural telephone line.

The Bell Telephone Co., which has free co-traffic with the General Telephone Co., receives, as we have mentioned, only subscribers living in Stockholm. Its subscription fee is 36 kronor (£ 2) for private, and 45 kronor (£ 2 1/2) for business premises, to which in both cases, as a rule, must be added an entrance fee of 10 kronor (11 *sh.*). This annual fee entitles the subscriber to free conversations with those subscribers of the other company whose names are marked with a star (»star-subscribers»; see below) and, besides, to 100 free conversations per quarter to the other subscribers in both companies; for every additional conversation asked for *from* this apparatus a payment of 10 öre (1 1/3 *d.*) is made. On the other hand, the subscribers have the full right of *receiving* any number of messages. The company has six small exchanges in different parts of the town. The number of the subscribers on December 31, 1903, amounted to 11,481. The staff, at the end of 1903 consisted of 95 operators, 7 belonging to the office staff, 1 civil engineer, and 29 porters and workmen, a total of 132 persons. The subscribed capital amounted to 1,000,000 kronor, and 6 % on this was received by the shareholders for 1902.

The General Telephone Co. has subscribers both in and around Stockholm, embracing a district with a radius of 70 km. from the Stortorget (Great Square) of Stockholm. In accordance with the fifty years' concession, mentioned above and dated May 1, 1891, the company possesses the right, within that district, of erecting telephone lines along the public highways and across ground belonging to the State.

The company has three exchanges within Stockholm, possessing on December 31, 1903, 18,081 subscribers' lines, and, within the conceded district, 152 exchanges, which, at the same time, had 5,198 subscribers' lines. The total of subscribers was thus 23,279. If we add to this the number of subscribers to the Bell Telephone company, the systems of the two collaborating companies on the date mentioned embraced no less than 34,760 apparatus.

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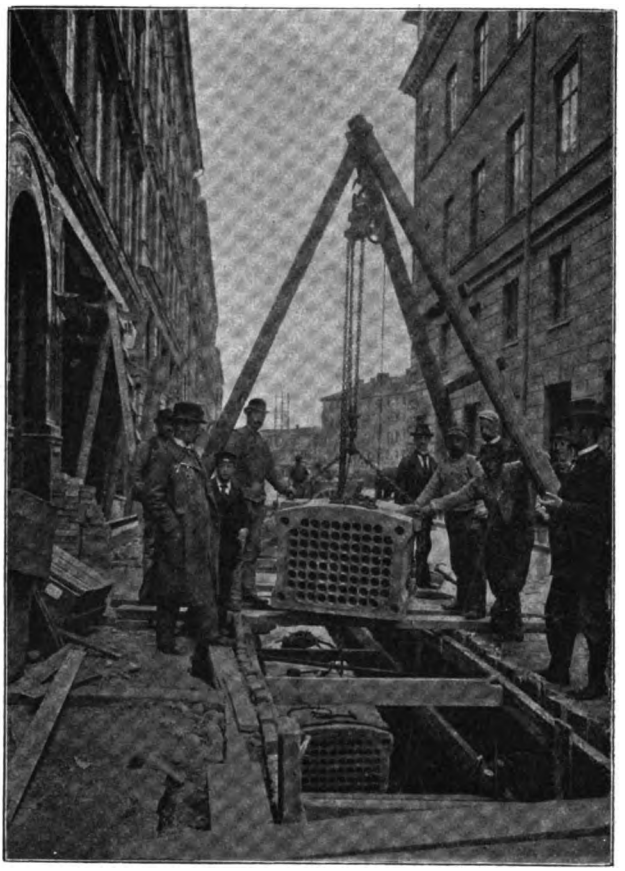

Putting down underground conduits.

In the General Telephone Co., where every subscriber has the right to unlimited calls, the fee for direct connection is 80 kronor (£ 4 2/5), and for simply combined connection (that is a connection which is so combined with another that both cannot *simultaneously call* for a conversation), 60 kronor, (£ 3 1/3) to which for both must be added an entrance fee of 50 kronor when the former tenant has not left behind him an apparatus and telephone line. If a subscriber with direct connection wishes to be marked with a star (*) in the subscribers' list, receiving thereby the advantage of the subscribers to the Bell Telephone Co. having free conversation with him — the yearly fee for this is 20 kronor. These »star-subscribers» amounted, on December 31, 1903, to more than 6,600. Subscribers outside Stockholm pay 50 kronor annually, besides a yearly sum of 10 to 15 kronor for the service. The entrance fee then depends upon the length of the line and amounts to 10 kronor for the first kilometer, and 40 kronor for each successive kilometer.

The company has lately erected a new exchange which can receive 20,000 subscribers. The staff consisted, on December 31, 1903, of 342 operators, 56 persons on the office staff, 17 civil a. o. engineers, and 243 porters and workmen, or a total of 658 persons. Since the company was formed, a dividend of 8 % has been paid annually upon the joint capital (now 2,700,000 kronor): no higher dividend must be obtained for its telephone business in Sweden, according to the regulations for this company.

The total value of the Bell Telephone Co. net amounts to about 2,200,000 kronor, and of the General Telephone Co. one to about 8,000,000 kronor.

The whole net of the two Stockholm companies is double-lined and, at present, one of the largest town-nets in the world with metallic circuit. Aerial cables are still used to a great extent (58 km. length of cables; 5,061 km. length of lines), but the underground cables are, however, preponderant (148 km. length of cables; 32,234 km. length of

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lines), to which must be added 295 km. length of lines in submarine cables. The total length of the bare wire lines amounts to 3,531 km. within the capital, and the length of lines outside the town to 12,827 km. The length of the wires is, of course, the double.

The General Telephone Co. uses instruments and office furniture exclusively of Swedish manufacture; the Bell Telephone Co. does so to the greatest extent.

At present, negotiations are going on between the State and the Companies concerning free co-traffic and exchange of subscribers and lines in order to create a better co-operation between the nets.

During the last few years the General Telephone Co. has extended its operations outside of Sweden, the company sending in a tender in response to a competition advertized by the Russian government respecting the erection of telephones in the five largest cities of **Russia,** with the result that the telephone service for 18 years in Moscow and Warsaw was handed over to two limited companies, in which the General Telephone Co. has entered as a partner and as the technical leader. In Moscow the telephone work is carried on by the *Swedish-Danish-Russian Telephone Co., Ltd.*, and in Warsaw by the *Cedergren Telephone Co., Ltd.* The managing director in both these companies is H. T. Cedergren. In accordance with the provisions of the concession now in force, the companies have purchased the telephone plants formerly set up in the two towns mentioned, by the International Bell Telephone Co., and these are calculated to be entirely reconstructed at the end of 1904 in accordance with the present standpoint of telephone technics. The capital required for the two companies is calculated to be: for that in Moscow 15·4 millions of kronor (for 20,000 subscribers), and for that in Warsaw 6·8 millions of kronor (for 10,000 subscribers).

Finally, the following figures may be given for a comparison between the development of the telephone system in Stockholm and that of some large cities in other countries. According to the latest data to hand, the figures are as follows.

	Population.	Telephone apparatus.	D:o., per 10,000 inhab.
Stockholm	302,000	29,000	960
San Francisco	340.000	24,000	706
Berlin	1.700,000	37,000	218
New York	1,800,000	27.000	150
Chicago	1,600.000	16,000	100
Paris	2,540,000	18,000	71
London	4,400,000	20,000	47

Thus Stockholm has not only a greater number of telephone apparatus in proportion to its population than any other city, but its absolute number only falls below that of Berlin and is on a level with the number of apparatus used in New York.

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XIV.

CREDIT AND INSURANCE ESTABLISHMENTS.

1. THE ROYAL MINT.

Since 1873, **gold** is the legal tender and the standard of value in the country. The monetary unit is 10 kronor in gold, and the counting unit is 1 krona, which is divided into 100 öre. Of gold there are struck coin pieces of 20, 10, and 5 kronor. The alloy employed consists of $^{9}/_{10}$ gold and $^{1}/_{10}$ copper. One kilogram of pure gold is coined into 2,480 kronor. A twenty kronor piece shall consequently contain 8·0645 grams of fine gold and have a gross weight of 8·9606 grams; the rest of the coin pieces are to have a percentage of pure gold and a weight in this same proportion. For the subsidiary coins silver and bronze are used. Of **silver** are struck pieces of 2 kronor, 1 krona, 50, 25, and 10 öre. The silver used is an alloy of silver and copper ($^{8}/_{10}$ silver and $^{2}/_{10}$ copper for 2 and 1 krona; $^{6}/_{10}$ silver and $^{4}/_{10}$ copper for 50 and 25 öre: $^{4}/_{10}$ silver and $^{6}/_{10}$ copper for 10 öre). Of **bronze** (95 % of copper, 4 % of tin, and 1 % of zinc) are struck pieces of 5, 2, and 1 öre. 100 kronor in two-kronor pieces, one-krona pieces, and fifty-öre pieces are to contain 600 grams of silver; the percentage of silver in 25 and 10 öre pieces is somewhat less.

With respect to **remedy** — or the greatest deviation allowable above or below the percentage and gross weight determined by the coinage law — there is the following regulation. *Gold coin:* remedy of fineness is $1^{1}/_{2}$ pro mille of the gross weight for all gold coins; remedy of weight is fixed for every particular piece as well as for a greater number thereof; the former is fixed to $1^{1}/_{2}$ pro mille for the twenty kronor piece, 2 pro mille for the ten kronor piece, and 3 pro mille for the five kronor piece; the latter to 5 grams for every weight of 10 kilograms (= $^{1}/_{2}$ pro mille). — *Silver coin:* remedy of fineness is 3 pro mille; remedy of weight is 3 pro mille for the two-kronor piece, and 5 pro mille for the one-krona piece; for the rest it is calculated per kilogram of coin and is fixed to 6 pro mille for fifty-öre pieces, 10 pro mille for twenty-five öre pieces, and 15 pro mille for ten-öre pieces.

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The coining is executed at the **Royal Mint.** It is free to all to deposit gold there for coining into 20 and 10 kronor pieces. As a rule, the gold deposited shall consist of gold suitable for coinage, and, as a whole, not be of a lower percentage than 900 thousandths. Gold not filling these requirements is also exceptionally accepted. Gold bullion as well as foreign coin is accepted. If the value of the gold deposited amounts to 1/2 million kronor at the least, the coining is done for the account of the owner. If the value be lower, it is left to the Director of the Mint to accept the gold, redeem it in cash, or write out a certificate for it, which is redeemed by the Bank of Sweden. Gold lots of a lower value than 500 kronor are not accepted. In all these cases, the coining expenses (reductions in coinage-charges are granted) are to be paid with 1/4 % for 20 kronor pieces, and 1/3 % for 10 kronor pieces; when remelting or toughening of the gold delivered for coinage is necessary, the expenses for these are also to be compensated. Any one desiring to have gold bullion exchanged for gold coin, has to give it in to the Royal Mint for the account of the Bank of Sweden, in which case the Bank of Sweden has to redeem it to a value of 2,480 kronor per kilogram of fine gold, with a deduction of 1/4 % of the coining expenses together with certain fees for toughening, if necessary; still the principals of the Bank of Sweden may, when they find it reasonable, exempt the owner from the coining charges or some part thereof. — 5 kronor pieces are coined only for the account of the State and the Bank of Sweden. Silver and bronze are coined only for the account of the State.

The gold coins naturally are **legal tender** for an unlimited amount. The token coins have the same paying value only in relation to the State; private persons, on the other hand, are not obliged to accept in one payment a greater amount than 20 kronor in one and two kronor pieces, 5 kronor in smaller silver coin, and 1 krona in bronze coin.

In the Public Treasury, as also in the head and branch offices of the Bank of Sweden in Gothenburg and in Malmö, every one may get any amount of subsidiary coins, divisible with 10 kronor, exchanged for gold coin. The Bank of Sweden has the same right in relation to the State.

Twenty and ten kronor pieces cease to be legal tender to private persons when they have lost more than 1/2 %, and to the State when they have lost more than 2 % of their gross weight. The five kronor piece loses its property of being legal tender to private persons when it has lost more than 0·6 % of its weight, and to the State when it cannot be seen whether it be coined for the account of the Kingdom. Token coins cease to be legal tender to private persons when the design has become indistinct and to the State in the same case as for five kronor pieces. Coins that have ceased to be legal tender to private persons may be received at certain Government offices and at the Bank of Sweden. Similar coins as well as silver ones having lost 4 % or more of their gross weight shall be melted down when they come into the Public Treasury.

Sweden and Denmark entered into a **monetary convention** May 27, 1873, to which Norway acceded October 16, 1875. According to this convention, all three countries have the same monetary system with essentially the same regulations.

The coin of each country has the same monetary value in the two other countries as in its own. Each country is bound to accept from the Public Treasury of the other countries such coin provided with its stamp, as is legal tender only in relation to the State. From the Public Treasuries of the other

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countries, each country is likewise bound to redeem with gold coin any amount of its own token, divisible with 10 kronor. On the other hand, there is no limitation as to the amount in the right of issuing subsidiary coins, either in the convention or in the Swedish legislation for the currency.

The convention ceases to be in force after one year's notice, with the provision, however, that the regulations just mentioned with regard to the obligation of the countries to redeem coins worn and token coins, are to remain in force two years after the ceasing of the convention.

The Assay Office.

By the Royal Assay act of December 7, 1752, which is still in force, with addenda and elucidations subsequently made, a public assay of the standard of all gold and silver articles manufactured in Sweden was prescribed by law, and for this purpose the **Assay Office** in Stockholm was simultaneously instituted.

Agreeable to this, it is not allowed to manufacture or sell gold articles of a standard lower than 750 ‰ fine gold, and silver articles of a standard lower than 812·5 ‰ fine silver.

Of gold articles, three different standards of fineness are assay-marked, viz., gold of 23 carats (ducat gold), of 20 carats (pistolett gold), and of 18 carats (crown gold), and of silver articles only one standard. Gold of twenty-three carats shall contain at least 969 ‰ of gold, of twenty carats at least 833 ‰, and gold of eighteen carats at least 750 ‰ of gold; silver shall contain at least 812·5 ‰ of silver.

Articles delivered for assaying must be furnished with certain marks, viz., the mark of the manufacturer, of the place of manufacture, and of the year of manufacture (from 1759 inclusive), and for gold also a stamp showing the yield of fine metal.

The assay-mark, which consists of three crowns on a blue blazoned background, is stamped on the Stockholm articles at the Assay Office, subsequent to examination, and in the provinces immediately on presentation, by town magistrates or by persons specially appointed, when samples of them are taken and later on sent in to the Assay Office, where they are examined, the manufacturer being responsible according to law for the fineness stated.

For the stamping with assay-mark is charged a duty of 5 öre (0·7 *d.*) per gram of gold, and 3·33 kronor (2²/₃ *sh.*) per kilogram of silver, when the articles are of a certain fineness* fixed for each different kind, and double this amount if the articles are found to be of a fineness intermediate between that fixed for them and the previously stated lowest yield of fine metal respectively. Some minor articles of gold and silver are exempted from this stamping with the assay-mark and the duty, but these articles must on penalty of the law, in case of an assay being executed, contain at the least the above stated lowest fineness.

No other gold and silver articles are allowed to be *imported* into Sweden than such that contain the above stated lowest fineness for the Swedish articles, in consequence of which all such articles imported shall be sent to the Assay office for examination, and, in case they hold the lowest fineness allowed, be stamped with the assay-mark, against the duty charged for the home article,

* This yield is for gold of twenty-three carats 976 ‰, for gold of twenty carats 840 ‰, for gold of eighteen carats 757 ‰, and for silver 820 ‰.

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besides which for these articles there is charged a fee for every assay necessary to be made. The articles not holding the fixed fineness must be re-exported. The import of foreign gold and silver articles seems to have been prohibited until 1826, and their assaying to have commenced in 1832. *

An account of gold and silver articles assayed in Sweden ever since the commencement of the assaying in 1754, is given in the Table on page 885.

2. BANKING.

The Bank of Sweden in former times.

The first bank in Sweden — the so-called **Palmstruch Bank** — received its charter in 1656. It consisted of two departments: the one (the bank of exchange) for the current account business (being forbidden to lend out deposited money or to credit any person with an amount which had not been deposited) — the other (the bank for loans) for the purpose of lending on securities (real estate, certain goods, and other valuables) and receiving deposits on interest. In 1661, the bank commenced to issue notes.

Through mismanagement the bank soon became insolvent, and bankruptcy could not be avoided, although the State came forward to help, among other things, declaring its notes to be legal tender and guaranteeing their payment. In the place of this bank a State Bank was established in 1668 — the »Bank of the Estates of the Realm», now the **Bank of Sweden** (Sveriges Riksbank) — which was to be solely managed by the Riksdag (the Government being withheld from all connection with the bank). Its business should be of the same kind and managed on the same principles as the afore mentioned Palmstruch Bank, but with the absolute prohibition to issue paper-currency. However, in 1701, the bank obtained the right of issuing notes.

At first the amount of paper-currency in circulation was but small, but after notes of a small value were permitted and when the bank with the purpose of promoting the trades, managed its loans in too liberal a manner, the issue of paper increased excessively, with the result that the bank in 1745 was obliged to suspend payment of the notes. In connection with the reformation of the currency in 1776 (when copper ceased to be the chief metal and silver became the country's only metallic standard), the bank again took up the payment of its notes, which it then reduced to about half their nominal value.

Soon, however, the money system became again disordered. When the State, as a result of the war against Russia in 1788/89, found itself obliged to raise a new loan, the Riksdag took over the administration of the State

* In 1832, also gold and silver articles of lower fineness than that above stated were allowed to be imported, and were stamped with a special assay-mark.

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debts, the management of which was left to a Board exclusively subordinating under the Riksdag — the National Debt Board. In order to get the State the necessary means, this Board was authorized, among other things, to issue notes and practice a sort of banking business. These notes, however, soon fell in value, whereas the notes issued by the Bank kept their original value. It was decided in 1802 that the Bank should cash with its own notes those issued by the National Debt Board, after the average rate of the latter ($^3/_4$ of the nominal value). Partly for these reasons, partly as a result of loans to the State during the war 1808/09, the condition of the Bank was so weakened that the value of the notes considerably declined. After many years of deliberations one succeeded, in 1830, in bringing order into the money system, and at the same time it was decided that the Bank should again resume payment of the notes with silver, but only at $^3/_8$ of their nominal value, which approximately corresponded to the market value of the notes. About the close of 1834, this decision was put into execution. From that time, the State bank-notes have always remained redeemable.

As already mentioned, the *loan business* of the Bank of Sweden consisted originally in loans on mortgage and lombard loans. The former gradually became loans on a long lease. Loans on personal security practically first came into existence after 1802, when the National Debt Board had concluded its aforementioned banking business. For the last named loan business a special establishment was instituted in connection with the Bank — *the State Discount* — which in the commencement was an association between the Bank and private shareholders; in 1816 the latter, however, were excluded. The real discounting business did not, however, develop until after 1830, and from that time the loan business of the Bank was gradually transformed into better conformity with rational banking principles. Thus, for example, in 1864, the mortgage business of the Bank ceased and was transferred to the General Mortgage Bank.

The Origin of Private Banks.

At the conclusion of the 18th century and the beginning of the 19th some Discount institutions were established, which were managed by the Riksdag together with private persons, and afterwards Discount Offices were established in some of the larger towns, privately and supported by the State Bank. These establishments had to give up their work on account of their failing successfully to fill the places of well organized credit institutions. In 1823, a special Committee of the Riksdag expressed the desireableness of all credit work being carried on by private persons instead of by the State. In conformity with the economical views of the time, it was considered that only in this way were to be expected the care and attention necessary for a credit institution. On the basis of this principle the committee brought forward a bill, accepted by the Riksdag and resulting in a Royal Proclamation of January 18, 1824. Herein the establishment of Private Banks was granted, but only after a concession to every special bank. Under the protection of this law, the first private banks in our country arose. In the absence of any provisions in the law regarding the issue of paper-currency, these banks found themselves at liberty to issue their own notes. The conditions of such an issue were determined later in

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a statute of 1846. Endeavours to replace these banks by Provincial Banks without the right to issue notes but supported by an advance from the State Bank not having met with satisfaction, new law decisions were made in 1864 for private banks of issue, which decisions, with regard to the issue of paper-currency and some other points, were changed through the Royal Ordinance of 1874. This latter remained valid to the end of 1903. The most important provisoes of the ordinance of 1874 were the following.

The partowners, the number of whom must, at least, be 30, were conjointly responsible for the liabilities of the Bank. At least 60 % of the subscribed capital should be invested in easily realized securities (mortgages or bonds) of undoubted safety; these so-called capital securities should be placed under public guard. Such banks had the right to issue notes to an amount corresponding to: *a*) the amount of capital securities placed in public guard; *b*) so large a part of the bank's assets from the public as corresponded to half of the subscribed capital, on condition that the bank at its head office should hold gold-currency to an amount of 10 % of the subscribed capital; and *c*) the bank's remaining supply of coined and uncoined gold at the head office. The smallest note should be 5 kronor (raised in 1879 to 10 kronor). Such a bank was authorized to deal in anything but gold and silver, home and foreign bills of exchange, and *bonds bearing interest;* it was not to possess any other real estate than that which the bank needed for its own use; nor to raise money on their own shares or those of other private banks. These banks were placed under the same public inspection and control as the now existing conjointly responsible private banks mentioned below.

As mentioned, this Ordinance ceased to be valid with the end of 1903. Herewith a type of bank disappeared which, during a period of 70 years' existence, had been of great importance to the economical development of our country. The change also was not brought about through discontent with the management of these banks. It should be mentioned that out of the 28 private banks of issue having existed, and of which 27 at the time of the new legislation still were at work, only one became insolvent, but that even in this case the solidarity was not called upon. The payment of the notes has also invariably taken place without disorder.

Bank Reform of 1897.

Before as well as after the Royal Ordinance of 1874, criticism was aimed against the currency system, more especially against the private banks, on account of a disproportion between the amount which the bank had right to issue and the metal stock. One hesitated long to make a change because it was feared that only the right to issue notes made it possible for the private banks to organize a number of branch offices in small places that much needed their presence, and to which the State Bank could not extend its work. The Royal Committee appointed in 1881 to examine these questions held to the opinion that certainly

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the right of paper issue for the private banks ought to be withdrawn and this issue concentrated to one particular bank. At the same time it was, however, pointed out that such a change could not take place without producing great difficulties in our national economy, therefore such an alteration in the State Bank organization and work must first take place to enable it to take up the total paper issue. For this reason the committee put forward a temporary bill requiring a further limit in the right of the private banks to issue paper and a better rendering for the safety of the payment of the notes. This bill, however, was refused, and in 1889 a new committee was appointed, which held the same view as the committee of 1881 regarding the desirability of having a monopolized currency issuing bank, and worked out a series of proposals for the realization of this desire. The committee pointed out that the Government ought to obtain some influence in the management of the State Bank. Propositions on basis of the committee's report were laid before the Riksdag but were passed only in 1897, and then in a very different condition. The question of the note issue was, however, thus finally solved, so that the right of issue should cease for the private banks with the end of 1903; thus from 1904 inclusive, the State Bank has the *monopoly of issuing paper-currency*. The chief points of the reform are to be found in the act of May 12, 1897, with reference to the Bank of Sweden, and it contains the decisions accounted for below.

Present management and business of the Bank of Sweden.

The rules for the management and business of the Bank of Sweden are partly laid down in the fundamental laws, partly in an act issued by the Government and the Riksdag. The law now in force of this latter kind is, as afore mentioned, the law of May 12, 1897. The statutes supplementing these laws are fixed by the Riksdag alone. The Board of the Bank of Sweden consists of seven delegates (called Fullmäktige), elected for three years, one of whom, the Chairman, is nominated by the Government, the others being chosen by the Riksdag through electors. The Board chooses from among its members, elected by the Riksdag, two *Deputies*, who act as managers of the Bank. A delegate must not be a member of the administration of any other bank than a savings-bank or the Post Office Savings-Bank.

The *capital stock* of the Bank shall amount to 50,000,000 kronor. — The *reserve fund* (at present 7,090,000 kronor) shall increase through annual deposits until it amounts to 25 % of the capital stock. The current *amount* may with 100 million kronor surmount the cash, which latter includes not only the stock of gold the Bank possesses in the country but also the gold under transportation from abroad, and the net amount to its credit in current accounts with foreign

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banks and business houses.* The *gold cash* of the Bank within the country shall always amount to at least 40 million kronor. If the gold cash surmounts 40 million kronor the issuing of notes can be further increased with, at the highest, the amount surpassing 40 million kronor. In this way, when the whole of the permissible issue of notes has been used, this can be increased with a double amount of the reinforcement of the gold cash.

Principally in order to be able to fill the want in the metallic cash, the home gold cash respectively the bank is authorized to use *foreign credit* to the amount fixed by the Riksdag in the bank statutes (at present 20 million kronor). To the same purpose serves, among other things, the rule that the bank shall possess easily salable foreign government bonds to an amount at least corresponding to the reserve fund. The *banknotes* are legal means of payment. The smallest value of a note is 5 kronor.

The bank **business** may include the following items. It can buy and sell Swedish bonds and easily salable foreign government bonds noted on a foreign Exchange and by other agreement take over the bonds of the Swedish State and easily salable foreign government bonds as well as negotiate the buying and selling of Swedish State bonds and the General Mortgage Bank scrips (see p. 599). The bank is allowed to discount, to buy and sell home and foreign bills of at the highest 6 months' notice; to give loans for a period not exceeding 6 months, on bonds, shares, and other valuable papers and goods; to discount valuable papers for an unlimited time with at the highest 3 months' notice; to open cash credit or credit on current account for a period not exceeding 12 months on bonds, shares, mortgages, or security guarantees.

On the security of the last mentioned guarantee, the Bank of Sweden besides this can grant instalment loans for long periods from a special fund (instalment loan fund) under its management, with a stock capital of 12½ million kronor. It is determined that, at the highest, 15 million kronor can be used as cash credit and as credit on current account. An encroachment on the liberty of the bank to choose between the above mentioned ways of lending out money, is the rule that such part of the current amount of notes as is not covered by metallic cash shall correspond to easily salable foreign government papers, Swedish bonds being noted on a foreign Exchange, and home and foreign bills of exchange.

The bank receives *investments* on deposit as well as on current account. For deposits the bank must as a rule not pay interest, it may, however, open a check account with interest to such firms as have discounting in the bank and who do not carry on banking business

* The three Scandinavian central banks have opened such accounts with each other in order, as far as possible, to prevent the despatching of gold between the respective banks.

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themselves. In conjunction with a current account business, the bank can also arrange *clearing*. This right the bank has also made use of in arranging a clearing business according to agreement with the larger banks in Stockholm, in which the greater number of the Swedish banks directly or indirectly take part. — The bank receives valuable goods in its care and keeping. It is compelled to receive money and to execute payments for the State without receiving any advantage. Payment cannot be made to a higher amount than the credit of the State in the bank; it should be observed, however, that the National Debt Board (p. 204), which continues in managing the national debt, can use cash credit to an amount not surmounting one and a half million kronor.

The Bank of Sweden shall, according to law, have at least one branch office in each Län outside the city of Stockholm and the Stockholm Län, thus at least 23 branch offices.

The Bank must not possess other real estate than what is necessary for its chief and branch offices, the fabrication of paper, and the printing work. — Each week an account of the metallic cash, of the current notes, and of the right not used to issue notes shall be published in the newspapers. At the end of each month, there shall be made public a statement of the bank's special assets and liabilities and at the end of each year a complete statement of the position of the Bank is to be delivered to the newspapers.

Private Banks.

When the Bank reform of 1897 was carried through, it became an important question whether the **private banks,** when their licenses came to an end in 1903, should become limited liability banks or have the right to remain conjointly responsible ones, although without a license to issue notes. This question was settled by the law of Sept. 18, 1903 on conjointly responsible bank companies. In it is stipulated that such a bank must have a Government concession that can be granted for a period not surpassing ten years. The capital stock shall consist of at least one million kronor; for banks with a small and locally limited business it may be less, although not below 200,000 kronor. The shareholders must be Swedish citizens, of a number no less than 30, and conjointly responsible for the fulfilment of all the liabilities of the bank. The capital stock shall be divided into equal lots; the amount paid must not fall below that represented by the share. The share certificates must be issued to certain named persons. A shareholder is not allowed to withdraw from the Company without the consent of the bank. At least 15 % of the yearly profit shall be placed to the reserve fund, until this fund has risen to half the amount of the capital stock.

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The business of these banks is liable to the following *restrictions.* Such a bank is not permitted to own any other real estate than that used for the business of the bank, and not possess or lend on its own share certificates or those of other conjointly responsible banking companies, neither carry on business with anything but gold, bills of exchange, or papers bearing interest.

Out of the 27 private banks existing in 1897, at present only 22 remain conjointly responsible.

Joint-stock Banks.

Through the law of October 6, 1848, the founding of limited liability banks was permitted, i. e., banks with limited responsibility for the shareholders and without a license to issue notes. The first limited bank was founded in 1863. By act of November 19, 1886, new conditions were fixed for establishing such limited banks. This act, which did not touch upon the 15 already existing limited banks, has been in force until the end of 1903 and has given the fundamental principles for the 31 limited banks founded during 1886/1903. The chief points of this act were as follows:

For the founding of such a bank a Government concession was required and this was not granted for a longer period than 20 years. The shareholders must be Swedish citizens, their number being at least 20. The capital stock should, as a rule, be at least 1 million kronor; for banks with a small and locally limited business the capital stock was permitted to be less, but not below 200,000 kronor. Fifteen per cent of the yearly profit should be set aside for the purpose of a reserve fund until this had amounted to half of the capital stock. The share certificates should be issued to a certain person.

The business was liable to the following *restrictions.* Such a bank was not permitted to own any other real estate than that needed for the business of the bank nor to possess or borrow upon its own shares, neither to carry on business with anything but gold, silver, bills of exchange, or papers bearing interest (thus not with shares).

The law now existing with regard to limited banking companies is of September 18, 1903. In the afore-mentioned details it differs only so far from the previous law that their license is limited to 10 years, and that they have no right to carry on business with anything but gold, home and foreign bills of exchange, and papers bearing interest, thus not with silver.

After the proclamation of this act one more bank has been founded. The *total number* of limited liability banks now existing amounts to 49.

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Office-room of the »Nordiska Kreditbanken» in Stockholm.

These banks are, in conformity with Private Banks, liable to a strict **public inspection.** This is carried out by a *Banking bureau* belonging to the Finance Department, the chief of the banking bureau being called »Bank Inspector». At the end of each month every bank has to make out statements on its condition and send them in to the Financial Department. Such a statement, which shall be written in accordance with the very detailed formula issued by the Department, shall be made up in the presence of the Governor of the Län or his deputy. The statements of all the banks are placed together by the Bank Inspector into one common statement, which is afterwards published. These banks are besides liable at any time to have their accounts and business papers accessible for the Governor or his deputy, for the Bank Inspector, and at any time when the Government or the chief of the Finance Department wishes to have a special examination made into the condition of the bank. They are, moreover, liable in all other respects to be called upon to give to the Chief of the Finance Department and the »Bank Inspector» all the information required by these. *The audited accounts* must be sent in to the Finance Department and appear in the newspapers. In the auditing of such a bank one person assigned by the Governor shall take part. If the reserve fund and 10 % of the capital stock have been lost, the bank must go into *liquidation*, if the shareholders do not decide upon replacing what the capital stock has lost.

The laws of 1886 and 1903 touch only upon such limited liability companies as carry on actual banking business (what is understood by this is not expressly mentioned), but those who only carry on a

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TABLE 161. *The condition of the Banks on Dec. 31, 1903.*
In million kronor à 1·10 shilling or 0·268 dollar.

	Bank of Sweden.	Private Banks.	Joint-stock Banks.	Total.
Liabilities.				
Capital paid-up	50 000	74·538	126·282	250·820
Surplus	12·918	46·609	57·093	116·620
Note Circulation *	165·848	4·051	0·535	170·429
Bank post-bills outstanding	2·062	18·969	18·477	39·508
Deposits	0·006	370·505	265·665	636·176
Current accounts	47·740	59·603	77·847	185·190
Savings	—	42·590	98·740	141·330
Due to foreign banks and bankers	0·861	18·236	26·315	45·412
Sundry accounts	3·971	117·473	153·373	274·817
Total	283·401	752·574	824·327	1,860·302
Assets.				
Cash in gold	59 006	0·239	0·135	59·380
Other Cash in hand	3·616	21·096	21·138	45·850
Investments	16·108	102·162	60·053	178·323
Due from foreign banks and bankers	19·333	17·177	11·440	47·950
Foreign bills	8·818	13·558	12·339	34·715
Discounts	89·233	181·772	168·197	439·202
Loans	18·478	247·922	359·759	626·154
Cash credits	4·598	118·954	123·873	247·425
Sundry accounts	64·216	49·694	67·393	181·303
Total	283·401	752·574	824·327	1,860·302
Unused issue of notes	30·641	—	—	30·641

system of loans on real estate or a pawnbroker's business, are expressly exempted from the regulations of this law. For these last named and for other companies which conduct a loan business without carrying on actual banking business, there is a special law of May 27, 1898, which, however, only prescribes that a Government concession is required, and that when granting such a concession, the Government has to observe that the companies' »Statutes of association» be in accordance with the law about joint-stock companies and other acts and statutes, and to determine upon the special stipulations required besides.

3. MORTGAGE ESTABLISHMENTS.

The mortgage establishments in our country having reference to agriculture are previously dealt with in a special article, p. 598. As for the rest, the most important are the General Mortgage Bank for the Towns of Sweden and the Stockholm Mortgage Security Company, Limited.

* The figure 0·535 million refers to four banks which have been reorganized into Limited Liability Banks.

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The General Mortgage Bank for the Towns of Sweden (Allmänna Hypotekskassan för Sveriges städer) was established in 1865; the regulations now in force and which have been confirmed by the Government, date from June 14, 1894. The object of this bank is to arrange a sufficient raising of loans for Mortgage Societies between real estate owners in the towns and boroughs of the kingdom, and also at other places with a dense population. With reference to the city mortgage societies, this bank thus forms an equivalent to what the General Mortgage Bank does for the agricultural mortgage societies. The bank has also the right to emit instalment loans to communities. Its accounts must be held accessible to the examination which the Government may desire to make.

The Stockholm Mortgage Security Company, Limited (Stockholms Inteckningsgarantiaktiebolag), as before mentioned, also carries on banking business, and is for that reason taken up among the »Joint-stock Banks» in Table 161, p. 1032. The object of the Company was originally »to facilitate the raising of loans on security of mortgage within the city of Stockholm, by giving security for repayment of capital when due, with or without interest». The Company also grants bank-credit for building. It has in a great measure contributed to the regulation and promotion of the real estate credit in Stockholm. The share capital amounts to $7^1/_2$ million kronor.

Mortgage security companies have been formed also in *Gothenburg*, *Gefle*, *Malmö* (Skånska Inteckningsbolaget), and *Helsingborg*.

4. SAVINGS-BANKS.

The oldest **savings-bank** proper in our country is the Gothenburg one, opened Oct. 28, 1820. The Stockholm Savings-Bank (Stockholms stads sparbank) was founded in 1821, and during the later years of the same decennium, similar institutions came into existence in most of the Läns of Sweden, in the northernmost though, not until the end of the forties and the beginning of the fifties. A considerable extension the savings-bank system first attained in the Län of Malmöhus, where, as early as 1850, fourteen large savings-banks were founded.

Of the development of the savings-bank system since 1860, the following figures bear witness, viz.: *

In	Savings-Banks.	Depositors.	Deposits. Kronor.	Average per depositor. Kronor.	Average per inhab. Kronor.
1860	149	187,675	27,291,937	145	7
1870	234	353,867	57,301,804	162	14
1880	340	762,638	146,071,708	192	32
1890	378	1,072,735	275,039,102	256	57
1895	372	1,098,116	339,339,266	309	69
1900	388	1,228,930	437,391,160	356	85
1902	394	1,281,663	496,105,019	387	95

Of the savings-banks existing in 1902, 103 belonged to the towns and 291 to the country, reckoned according to the situation of the head office.

* A krona = 1·10 shilling or 0·268 dollar.

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The savings-banks in Sweden are institutions for public benefit, but of a private nature, and with an almost unlimited freedom of administration. In this they differ from those of several other countries, e. g., Great Britain and France, whose savings-banks must chiefly place their means into the care of the State or invest them in State bonds; those of Belgium, whose Caisse Générale d'Épargne et de Retraite is a State institution (which collects savings also through the post offices, and therefore, in a certain manner, is a P. O. savings-bank); and those of the German States, where the administration of the savings-banks is most frequently an affair devolving upon the community. The first Swedish Savings-Bank Law, of 1875, ordains that there must be no distribution of dividends in savings-banks; the law of 1892, now in force, defines a savings-bank as a »financial institution which, without right for its founders or their assigns to appropriate any share in the profits which may arise from the business, has for its object to receive money from the public, to put it out to interest, to increase it still more by adding the interest to the capital, and to repay the money when notice is given to that effect», besides which it is ordained that no other financial institution must carry on its business under the name of savings-bank without special license.

The subscribed capital and reserve funds of the Swedish savings-banks corresponded, during the first years of the nineties, on an average to about 9 per cent of the deposit fund, but in 1902 only amounted to 8·6 per cent of this fund. The regress in the relation between funds and deposited capital finds its explanation in the rapid growth attained by the latter during the nineties and with which the deposits to the funds have not been able to keep pace. — With respect to the manner of augmenting the savings-bank money, the following Table shows the relation between the different kinds of *investment.*

	In 1880.	In 1890.	In 1900.	In 1902.
Bonds, claims on communities, and the like.....	16·04 %	11·60 %	16·48 %	15·59 %
Claims on private persons, secured by mortgage...	42·70 »	51·54 »	51·37 »	52·55 »
» » » » on personal caution.....	30·76 »	24·61 »	17·98 »	18·10 »
In cash and other accounts.....	10·50 »	12·25 »	14·17 »	13·76 »

It will be seen by this Table that claims on personal caution have, since the eighties, been relatively decreasing in number, whereas investments on mortgage have come into more general use. Loans on personal caution, however, still play a very considerable part in the small savings-banks, principally those situated in the provinces, where a more personal relation exists between the banks and their customers, and it is only in proportion to the size of the savings-banks that the significance of such loans decreases, and the money of the bank is rather placed in loans secured by mortgage or in public bonds. For 1902, we have the following statistics:

In Savings-banks with total deposits of:	Bonds, Community claims, etc.	Claims on private persons. Mortgage.	Claims on private persons. Personal caution.	Cash and other accounts.
Below 50,000 kronor.....	4·20 %	38·10 %	43·59 %	14·11 %
50,000— 100,000 »	2·36 »	37·35 »	48·91 »	11·38 »
100,000— 250,000 »	4·53 »	41·52 »	44·25 »	9·70 »
250,000— 500,000 »	3·87 »	46·96 »	38·37 »	10·80 »
500,000—1,000,000 »	6·87 »	46·53 »	35·58 »	11·02 »
1,000,000—5,000,000 »	12·48 »	53·05 »	19·36 »	15·11 »
Above 5,000,000 »	23·20 »	55·28 »	7·67 »	13·85 »

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The costs of administrating the savings-banks amounted in 1902 on an average to 0·42 %, calculated in relation to the means deposited; in 1898 they amounted in the largest savings-banks (the last group above) to 0·33 %, in the smallest (the first group), to 0·69 %, and in the group with deposit-funds between 50,000 and 100,000 kronor, to 0·61 %.

In regard to the *rate of interest* — which according to a closer investigation as regards the year 1896 (a year that, with regard to interests, may be considered more typical than any of the later years) varied between 3 and 3½ % on deposit-accounts at six months' notice in the private and in the joint-stock banks, — it amounted, on a general average for the said year, in the savings-banks for the same year, to 3·83 % (effectively 3·77 %), but with considerable differences between banks of different sizes. In 64 savings-banks, whose average deposit-capital amounted to about 2,300,000 kronor, the interest was 3·6 % (the same as in the P. O. savings-bank for the same year), in 207 savings-banks with an average capital of about 800,000 kronor, it amounted to 4 %, and in 42 savings-banks, where the average-deposit fund amounted to 330,000 kronor, an interest of 4½ % was paid. — The fact that the smaller savings-banks, in spite of their relatively greater expenses, can thus give their depositors a higher interest than the larger banks, obviously stands in connection with the nature of their lending system, which, as shown above, in a much more extensive degree than the lending in the larger savings-banks, is based upon the more profitable surety-system.

In 1884, the Swedish **Post office savings-bank** was opened. This institution, which through the post offices collects deposits and makes payments (after notice being given), belongs to the State, which stands surety for the means deposited in it; the administration is placed in the hands of a Board of Directors, consisting of the Post Master General (chairman), and four members, namely a Chief Secretary in the General Board of P. O. Directors, who has in hand the matters concerning the P. O. savings-bank, one member appointed by the King, a Commissioner of the Bank of Sweden, and a Commissioner of the National Debt Office. — The development of the P. O. savings-bank is shown by the following figures:

In	Number of offices.	Number of pass-books.	Money deposited. Kronor.	Money deposited per pass-book. Kronor.	Money deposited per inh. Kronor.
1884	1,575	79,513	827,641	10·41	0·18
1890	1,942	237,060	13,016,554	54·91	2·72
1895	2,251	408,288	38,477,499	94·24	7·82
1900	2,652	566,805	56,461,391	99·61	10·99
1902	2,801	587,310	53,916,398	93·84	10·37

The most important purpose of our P. O. savings-bank, with respect to the size of the sums deposited, is to compensate for the absence of private savings-banks in the sparsely inhabited regions of the country, where such savings-banks could not be opened. Thus, the greatest amount of money deposited per inhabitant, at the end of 1902, was in the Län of Vermland (28·34 kronor) and in that of Kopparberg (17·64 kronor), while the lowest amounts were to be found in the Län of Kristianstad (0·11 kronor) and that of Malmöhus (0·36 kronor). But owing to the advantages which the P. O. savings-bank offers — especially its easy accessibility — it has, even in such places where plenty of private

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savings-banks are to be found, to a certain degree become a competitor to these, and the sums deposited in it, which in 1893 amounted to 11·2 % of the sum total deposited during the whole year in the P. O. savings-bank and the private savings-banks together, had in 1896 risen to 20·6 % of the sum total deposited that year. During the last few years a regress has, however, shown itself, owing to the higher interest given by private banks; thus the aforesaid proportion was, in 1902, only 11·0 %.

The Stockholm Savings-Bank.

In regard to the nature of the development of the P. O. savings-bank, we also find a testimony in the circumstances that the average amount of a first deposit has grown from 6·22 kronor in 1884, to 99·18 kronor in 1896 (though decreased again to 45·62 kronor in 1902), and the average amount of an investment in general, from 4·60 kronor to 40·03 kronor (in 1902, only 22·47 kronor) during the same period. In its originally intended main purpose — to constitute a constantly accessible and fully reliable savings-bank for people in small circumstances, and especially for the rising generation, — the P. O. savings-bank has, on the other hand, not made any visible progress. The sale of saving-stamps * amounted in 1884 (at 1,343 post-offices and 1,773 private sellers)

* In order to facilitate the collection of quite small amounts, so-called *saving-stamps*, at 10 öre each (1 1/3 *d.*) are kept for sale both at the post offices and by private persons; these stamps are affixed on a card, which, when the sum amounts to 1 krona, can be deposited in the nearest P. O. savings-bank office.

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to a total number of 1,558,676, but in 1886 (at 1,559 post-offices and 3,022 private sellers) only to 1,049,292, and in 1902 (when such sale occurred at 2,795 post-offices and 1,545 private sellers) to 1,196,948 saving-stamps were sold.

The rate of interest at the P. O. savings-bank was 3·6 % till the end of 1896, when it was lowered to 3·3 %, but has from July 1, 1899 inclusive again been raised, until further notice, to 3·6 %. Thus it is lower than the average rate of interest at the savings-banks (3·83 % in 1896, 4·25 % in 1902), and considerably lower than that generally paid by the smaller savings-banks to their depositors — a necessary consequence of the stricter regulations for the administration of the P. O. savings-bank means, which regulations until 1902 did not allow of any other investments than in the bonds of the State, of the General Mortgage Bank (see p. 599), and of communities, or else in community loans, against promissory notes. In 1902, however, the P. O. savings-bank obtained the right of investing at the most 1/4 of its capital in bonds against surety of mortgage. — With respect to the *costs of administration*, they amounted in 1902 to 0·44 % of the total capital deposited, and were thus of about the same relative size as in the largest private savings-banks in 1898 (0·33 %, see above). Here it should, however, be remembered that the remaining average amount per pass-book in the P. O. savings-bank was only 93 kronor, whereas it was 387 kronor in the private savings-banks, and if we reckon the costs in proportion to the transactions of the respective year, they come to 0·87 % for the P. O. savings-bank, but for the private savings-banks to 1·09 % (and for both kinds altogether to 1·06 %).

Regarded as savings-banks, the so-called **Solidariska Folkbanker** (conjointly responsible People's banks) are of rather little importance — 28 of them being taken up in the official statistics for 1902, with 33,296 depositors on the savings-bank accounts, and 15,204,112 kronor in savings-bank deposits. The People's banks have not the character of institutions for public benefit, possessed by the savings-banks, but are pure business enterprises on a small scale, giving dividends and principally aiming at the benefit of their shareholders; besides the savings-bank business, they carry on discounting of bills of exchange. With respect to their savings-bank business, the law of 1903 is valid for their inspection, but the stipulations of this law are very brief.

The oldest of the still existing conjointly responsible People's banks, and at the same time the one which carries on the most extensive business, is the Örebro Folkbank, opened in 1867. — Several of the original »Solidariska Folkbanker» are now reorganized into joint-stock banks, and as such carry on their business with or without retaining their name of »Folkbank».

Besides by the People's banks, reorganized into joint-stock banks, savings-bank business has since long ago been carried on also by a majority of other **Joint-stock banks,** and during later years the same business has been taken up by most of the **Private banks** (see p. 1026 and 1029). This savings-bank business of the different banks, has from Jan. 30, 1897, (there being no complete statistics previous to this date) to Dec. 31, 1903, increased in the way shown by the following figures:

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Time.	Private banks.		Joint-stock banks.		Together.	
	Account-holders.	Deposit, kronor.	Account-holders.	Deposit, kronor.	Account-holders.	Deposit, kronor.
30/1 1897	2,015	1,384,066	54,928	22,826,289	56,943	24,210,355
31/12 1897	6,507	5,926,473	60,691	28,450,275	67,198	34,376,748
31/12 1898	21,652	24,532,615	73,709	40,028,784	95,361	64,561,399
31/8 1899	32,783	29,411,089	95,461	57,010,338	128,244	86,421,427
30/11 1899	37,176	29,560,866	99,491	54,640,545	136,667	84,201,411
30/12 1899	37,174	26,501,580	102,206	48,748,077	139,380	75,460,714
31/1 1900	42,859	27,180,819	104,335	48,959,134	147,194	75,928,896
31/12 1900	65,138	36,717,746	118,088	53,962,690	183,220	90,680,436
31/12 1903	87,266	42,589,958	223,331	98,739,983	310,597	141,329,941

The average amount per account-holder was:

	Private Banks.	Joint-stock Banks.	Private and Joint-stock Banks.
30/1 1897	687 kronor.	416 kronor.	425 kronor.
31/8 1899	897 »	597 »	674 »
31/1 1900	634 »	467 »	516 »
31/12 1900	564 »	457 »	495 »
31/12 1903	488 »	442 »	455 »

The main cause of this rapid growth of the deposits on savings-bank accounts at the banks (which in no small degree took place at the expense of the P. O. savings-bank, the larger savings-banks, and of the current accounts of these banks themselves), ought to be sought for in the strong competition between the many joint-stock banks recently organized, which competition also affected the older joint-stock banks as well as the private banks, and, during the scarcity of money occurring later on, expressed itself in offering high interest, besides other very advantageous conditions for depositing on the savings-bank account.

The total amount

of money on deposit in Sweden on savings-bank account was Dec. 31, 1902, as follows:

In Private Savings-banks	496,105,019	kronor.
In the P. O. savings-bank	53,916,398	»
In the »Solidariska Folkbanker»	15,204,112	»
In Private and Joint-stock banks	116,890,666	»
Total	682,116,195	kronor.

At the same time, there was on deposit in the banks (including the Bank of Sweden):

On deposit-account	622,853,796	kronor.
On cheque-account, account current, and account of deposits without interest	173,418,306	»

That the savings-bank account, with respect to the size of the amounts deposited thereon, thus has a significance nearly corresponding to that of all the other bank-deposits of the public, finds its explanation

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in the fact that the savings-bank system in Sweden, as in other countries, practically embraces — besides the saving-up of smaller sums to form a capital, or savings-bank business proper — also two (if not three) other branches of banking. It includes namely also the investment of already formed capital (or what we in the banks generally term deposit), and, besides, a kind of cash business for the household, corresponding to the cheque-account of the business-world at large (and finally and exceptionally cheque-account business proper). As already formed capital we ought at least to consider a large number of the savings-bank deposits of 2,000 kronor and upwards; in 1902 the deposits of this size amounted altogether to a sum no less than 193,196,247 kronor, or 38·9 % of the whole sum on deposit.[1] For household account (eventually cheque-account), we principally use the savings-bank divisions of the ordinary banks, less frequently the savings-banks proper and the P. O. savings-bank, which are encumbered by regulations for giving long notice (that being seen from the relation of the sums taken out to the sums left on deposit, in 1902 constituting no more than 18·6 % in the savings-banks, and 27·0 in the P. O. savings-bank).

In order to prevent the use of savings-banks for investment of capital, the regulations of most among them include stipulations for a certain maximum sum of deposit on which interest may be reckoned, and the limit is usually placed at 2,000, 3,000, or 5,000 kronor; but even 10,000 kronor and still higher sums, up to 50,000 kronor, occur, especially in the southern Läns. For the P. O. savings-bank, the corresponding maximum is (since 1891) fixed at 2,000 kronor and, from 1900 inclusive, the banks proper are forbidden to receive on interest, on savings-bank or other similar account, a higher sum than 3,000 kronor, — a stipulation which is doubtless partly aimed against the bad practice of depositing on savings-bank account means which properly ought to be classified under cheque-account. — The use of the savings-banks as cash institutions for deposits of a more temporary nature is rendered difficult by the provision of the savings-bank law that a savings-bank is not in duty bound to make itself liable to pay back deposited means except at a certain time after due notice having been given (it being left open for the Boards of Directors, though, to grant repayment without awaiting the expiration of the notice-time when this can be done without inconvenience to the bank). The said proviso, with the addition that the time of notice shall be at least a week, is (with the same right for the Boards concerned, of granting exceptions) in force from 1900 inclusive also for the savings-bank accounts of the banks; but the praxis may be considered still generally prevalent in the banks that money deposited on savings-bank account, as a rule, is paid on demand. As to the P. O. savings-bank, its pass-books may be used for deposits and drawings at any office of the P. O. savings-bank in the whole Kingdom, and consequently no money, deposited in the P. O. savings-bank can be drawn without notice and order of payment from the central office.

About the nature itself of the varieties described of the savings-bank system, it may, however, safely be said that none of them (except the cheque-account business) is in itself illegitimate for the savings-banks. What is unsuitable is

[1] In Malmöhus Län, the percentage of such sums left on deposit was 54·4, in that of Jemtland, 47·5; in the Län of Stockholm, 46·6; in the City of Stockholm, 45·8; in the Län of Kristianstad, 45·2; and in that of Göteborg och Bohus, 44·1.

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only the lack of special conditions and provisions for each of the different branches of business. But this deficiency can be remedied. And even if it ought perhaps to be acknowledged that the deposit-account of the banks, from several points of view, is better qualified than the savings-bank account to take up the real capital on interest, it must, on the other hand, not be overlooked that only the large sums, administered at a relatively smaller cost, on the whole make it possible to continue the savings-bank business with a payment of fair interest; whereas, with respect to the cashing of means without previous notice being given, it can hardly be denied that an a-vista account, separate from the cheque-account and intended for the household, would be of great importance, especially for salaried officials, tradesmen, and manufacturers.

5. INSURANCE.

Apart from certain provisions introduced in common laws relating to special branches of insurance, Sweden obtained her first **insurance legislation** by means of two royal ordinances of October 22, 1886: concerning the organizing of inspection of home insurance institutions and concerning the conditions for the license of foreign companies to prosecute insurance business in the kingdom.

For home as well as foreign institutions license should be applied for from the proper authority, as also annual reports should be deposited with the Royal Department for Home Affairs; foreign institution had to submit to Swedish law concerning insurance business in the kingdom, and this business should be carried on under the management of a person resident in the kingdom having certain qualifications prescribed in the Royal ordinance. The Royal Department for Home Affairs, through a specially appointed officer (the insurance inspector), was to exercise control and publish an annual report concerning the entire insurance business in the kingdom, therein not included, however, the activity of Sick and Burial or other similar mutual helpfunds.

In connection with the new Swedish company-legislation there was issued on June 28, 1895, a special »Law in regard to joint-stock companies carrying on insurance business»; but this law was only intended to make insurance joint-stock companies retain the sanction system, otherwise generally exchanged for the *statute-system*, while the new joint-stock company law in other points also applied to them.

Meanwhile the necessity of an insurance law, improved and perfected in certain parts, was more and more generally recognized; as to life insurance business, a proposal with regard to a legislation in common for the three northern countries was made (December 22, 1900) by delegates, appointed by the governments.

Such a »Scandinavian» insurance legislation has, however, not come into existence; but, in substantial conformity with a Royal proposition to the Riksdag of 1903, a bill for **new insurance laws** was accepted by this same Riksdag, which laws were duly sanctioned by the Government on *July 24, 1903*, viz.: a **Law concerning the insurance business,** a **Law concerning the right of foreign insurance institution for prosecuting insurance business in this kingdom**, as well as four minor laws concerning alteration in the wording of certain §§ in the general laws and ordinances now in force, necessitated by the acceptance of the two first mentioned laws.

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The *Law* just mentioned *concerning the insurance business* comprises no less than 166 §§, partly in consequence of the fact that all the provisions of the laws about joint-stock companies, applicable to insurance institutions, have in this law been taken up in special §§ for joint-stock companies and mutual companies separately. The system of *sanctioning* is retained, though with more exact specifications of the stipulations to be entered in the statutes, the sanctioning of which must be applied for to the Government by the founders of an insurance company. The instructions with regard to *publicity* have been retained, with some alterations, especially in regard to life insurance companies; in their annual reports certain technical falls must be accounted for by a duly qualified actuary.

In *mutual companies* the part-owners are the persons insured, and these are, with unlimited — or up to a certain amount limited — liability, personally liable for the obligations of such company; still, in a company whose activity does not concern the insurance of property, it may be decreed that only the assets of the company are liable for its obligations. If mutual company be formed by means of addition of a guarantee capital, this shall be fully paid up within two years from the constitution of the company, and if the company be dissolved before the guarantee capital has been repaid in the manner prescribed in the company regulations sanctioned, the trustees are not entitled to enjoy payment (for amount added) out of the assets of the company before the other debts of the company have been paid in full. *Joint-stock company as well as mutual company* shall in its balance sheet put down as debt »insurance fund», including 1) *compensation reserve*, corresponding to insurance amounts not paid out, though payable or notified for compensation; as also, 2) where the company collects premium for insurance overlapping the time for the expiration of the financial year, *premium reserve*, corresponding to the aggregate value of all running insurances; for company which carries on life insurance business, the *premium reserve* for life insurances (including life-annuity and endowment assurances) shall be shown to amount to the difference between the actual value of the company's obligations in consequence of current life insurances (with deduction of amount which has been advanced against the security of insurance policy within surrender value), and the actual value of the net premiums, which the policy-holders may still further have to pay. In what kind of securities the assets, which correspond to the insurance fund, shall be accounted for, is specified *for life insurance* (§ 123), and *for other insurances for all future time or for longer period than 10 years* (§ 124); *these* securities shall be kept separate from other assets of the company and under no less than two special locks having different keys, of which one in the possession of a person duly appointed by the governor of the Län, and »in the securities thus kept the policy-holders» — *also in mutual companies without personal liability* — »enjoy the right of pledging, just as the holder of a pawn».

Insurance company prosecuting *life* insurance business shall, apart from the insurance fund, make reservation for a »security fund», which, without allowance of the Insurance Inspection, may not be reduced except for covering loss which could not be compensated by annual profits or reserve fund (where such exists); and said reservation shall amount to no less than half the annual profits until the security fund has amounted to 5 % of the insurance fund for life insurances.

Inspection of insurance company is exercised by an *Insurance Inspection* common to the whole kingdom, concerning the organization and activity of which further instructions have been issued by the Government, and concerning the decision of which inspection appeal may be made to the Government; at the Royal Department of Home Affairs a special officer for insurance matters has therefore been appointed. The Insurance Inspection consists of a mathematician as chief

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director and two members, with a secretary versed in jurisprudence, a registrar, and other assistants. For covering the expenses of the Inspection each insurance company shall contribute with, at the most, a fifth per cent of the company's entire income of fees for the previous calendar year for insurances here in the kingdom. The Insurance inspection which shall, among other things, issue an annual report concerning insurance business in the kingdom, and has very extensive powers with relation to the supervision of the accounts and management of the home companies, shall also manage the estate in the special administration which ensues for the preservation of the rights of the policy-holders, in the event of life insurance company having come under liquidation or in state of bankruptcy, for which case detailed provisions are introduced in the law. If company carrying on life insurance business desire to transfer its life insurance stock or certain portion thereof, also when two or more companies desire to combine to form a new company with the object of taking over their obligations in consequence of life insurances, sanction shall be applied for at the Insurance inspection, which application, however, is not accepted for consideration if, within a certain time after announcement has been inserted in public journal, sanction has been opposed by at least one fifth of the policy-holders, the policies of whom are intended to be transferred to an eventual new company. Different from the corresponding Royal ordinance of October 22, 1886, the new law contains specified provisions relating to responsibility for violating its provisions. The penalty for various offences varies between fines of 5 to 5,000 kronor, when punishment for the offence is not stated in the common penal code.

The law cannot be applied to: — a) institution established by the State; b) institution which only grants insurance against loss on money claims or other values; c) »interest and capital insurance institution»; d) mutual insurance company for insuring property in country districts where the field of activity is less than a hundred (härad); e) sick and burial fund or other such mutual help society whose activity has not for its object the carrying on of an insurance business as a commercial undertaking. And in the question of reinsurance the Government may admit of certain deviations.

The law of July 24, 1903, mentioned above, relating to *foreign* insurance institutions differs slightly from the corresponding Royal ordinance of October 22, 1886. The following are, however, important additions: — Among the documents which shall accompany the application for permission from the Insurance inspection to carry on an insurance business in the kingdom, is also a testimony to the fact that the institution, in the manner and under the conditions acknowledged by the Insurance inspection, has deposited with the Bank of Sweden, in money or securities, a sum of 100,000 kronor for life (including life-annuity and endowment) insurance, the same amount for fire insurance or for marine insurance, and 50,000 kronor for every other kind of insurance. Amounts thus deposited may only be employed for payment of claims in consequence of insurance agreements belonging to the business of the institution in the kingdom, as well as fines, fees, and compensation which on account of the same business may be imposed upon a general agent or the institution; and the right of carrying on business in the kingdom is forfeited, if upon the reduction of the amount the discrepancy be not filled within four weeks after intimation to that effect has been received from the Insurance inspection. It is expressly forbidden to foreign company directly or indirectly to state itself as having, in consequence of said deposits, placed reliable security for its Swedish policy-holders or in any way to give to understand that it is under the control of the Swedish State as to its entire activity. Permission to carry on business shall be denied if the principles for the activity of the institution be ascertained to be based on

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a system which apparently does not permit of a sure and safe insurance activity or such as, with reference to the tenets of the document accompanying the application, do not seem realizable; and the license may be canceled in consequence of deviation from this law. The prosecution of insurance business on foreign account without permission is punishable with fines from 50 kronor to 5,000 kronor for each time summons therefore has been issued and served. For other various offenses against the provisions of the law fines can be sentenced varying from 5 kronor to 2,000 kronor where punishment for the offense is not stated in the common penal code. Fines which fall to the Crown, can be commuted in accordance with the common penal code. This law does not relate to reinsurance.

The new insurance laws have come into force from the commencement of 1904 inclusive.

Marine insurance. In the introduction to the marine law of 1667 there are expressly mentioned, among the »useful inventions» which have necessitated the new law, »bottomries and insurances»; and the law itself contains an insurance section, divided into 18 short chapters.

At the time of the issuing of this law, there were, however, no home insurance institutions in Sweden, except, perhaps, solitary partnerships or »simple companies» (according to the present terminology), in the form of more or less permanent unions of private marine insurers, who through the negotiations of brokers undertook marine risks. At least, Swedish shipowners and merchants were principally obliged to take marine insurance in such private insurance unions in foreign countries, — mostly in the Netherlands and in the Hanse Cities of Northern Germany. According to an estimate of 1733 in the Argus, a paper edited by O. DALIN, the marine insurance premiums annually drew about one million Dutch guldens out of the country. But by Royal Resolution of July 4, 1739, on an application of the Estate of Burgesses at the Riksdag ending that year, a privilege was granted and »Association Rules» were confirmed for a company, *Sjöassuranskompaniet*, founded on voluntarily signed lots with limited responsibility, which company began its activity the following year, and was thus one of the earliest joint-stock companies in Europe for marine insurance. The second Swedish company of the same kind, *Stockholms Sjöassuranssällskap*, did not obtain its privileges until 1816. In 1844 was organized the first large mutual company in this branch of insurance, *Stockholms Sjöassuransförening* (now discontinued as well as the two aforesaid companies).

The development, now attained by home insurance — quite considerable for our circumstances — dates from about 1860 and 1870, when several *joint-stock companies* founded on a perfectly modern basis, were organized. At the end of 1901 there were 8 such companies in activity: Gauthiod (sanctioned 1863), Stockholms Sjöförsäkringsaktiebolag (1867), Ägir (1872), Ocean (1872), Sveriges Allmänna Sjöförsäkringsaktiebolag (1872), Vega (1882), Sjöassuranskompaniet (1889), Öresund (1890). The same year there were in activity 15 *mutual home companies*, among which the most important is *Sveriges ångfartygsassuransförening*. In Sweden speculative business enterprises always play an incomparably greater part than mutual institutions for marine insurance, which, of course, is also generally the case in other countries. Besides the home institutions, there were in 1901 also 11 *foreign companies* engaged

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in this branch of insurance, some of which also carry on land transport insurance. The amounts written by above mentioned companies was for 1901 in kronor:

Companies.	Concluded insurances.		Brutto premiums.	Premiums for reinsurances.	Indemnities.*	
	Brutto.	Reinsured.			Brutto.	By reinsurers.
Swedish joint-stock companies	988,604,824	425,895,438	10,739,240	5,956,940	7,613,957	4,530,981
D:o mutual companies	64,409,919	35,589,870	3,202,233	2,085,152	1,775,000	925,000
Total Swedish companies	1,053,014,743	461,485,308	13,941,473	8,042,092	9,388,957	5,455,981
Foreign companies	75,146,812	21,689,340	204,501	52,406	87,304	26,895
Total	1,128,161,555	483,174,648	14,145,974	8,094,498	9,476,261	5,482,876

The insurance belonging to the field of transport insurance (registering and assuring) of letters and other postal transmittances has hitherto, before the foundation of the National Insurance Office (see p. 1073), been the only insurance work done by the Swedish *State*.

Fire Insurance. There is no doubt but that the provisions of the Swedish provincial laws (from the 13th and 14th centuries) were founded on the ancient right of custom, which provisions obliged all the inhabitants of the same hundred (härad) to give mutual support in case of damages by fire, — provisions which afterwards, with certain alterations, were embodied in the common laws of the country, and may be characterized as laws for obligatory mutual fire insurance, especially since it was ordained (in the »Huses Ordningen» of 1681) that the sum of the firetax should be fixed according to »the size of the damage». The indemnity fixed by the law originally embraced only the buildings though, from the end of the seventeenth century also grain, fodder, and cattle, but only what was necessary for the use of the farm, not other chattels or household furniture. Not until the nineteenth century was the obligatory hundred (härad) fire insurance re-organized into mutual, smaller fire insurance companies on the voluntary basis, but retaining the right to have the premiums collected together with the Crown taxes. But as early as 1688, the first Swedish fire insurance association was organized which was intended for insurance takers from at least one province and embracing chattel-insurance too.

The first fire insurance institution in Stockholm — *Stockholms Stads Brandförsäkringskontor*, a kind of public corporative but free, mutual association — had its first code of by-laws confirmed on March 18, 1746. — The oldest fire insurance company in Sweden is *Skandia*, the pioneer also in Swedish life insurance; its first Association statutes were sanctioned on January 12, 1855. In 1901, there were operating, besides Skandia, two other home joint-stock companies, *Svea* (in Gothenburg since 1867) and *Skåne* (in Malmö since 1884), which carry on both fire and life insurance business, and three, *Fenix* (1889), *Norrland* (1890), and *Victoria* (1899), which are exclusively fire insurance companies;

* The figures for the mutual companies are only approximate.

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furthermore, thirteen larger home *mutual companies*, 6 of which embrace the *whole kingdom* (among which Städernas allmänna brandstodsbolag and Allmänna brandförsäkringsverket for buildings in the country), 5, *more than one Län* (among which Skånska brandförsäkringsinrättningen), 2, only the *city of Stockholm* (the aforesaid Stockholms Stads Brandförsäkringskontor and, since 1844, Stockholms Stads Brandstodsbolag for the insurance of chattels); 24 home mutual institutions, each of which embraces *one län;* and finally no less than 366 *smaller*, mutual (hundred, parish, and pastorate, etc.) companies; besides Swedish general agencies for 24 foreign companies. Of these, 3 were Danish, 1 Finnish, 5 German, 1 Swiss, 11 English, 1 French, and 2 Dutch; all except 5 (German) were members of the **Tariff Union** of Swedish joint-stock companies, which was founded in 1874 and takes resolutions binding to the members about the size of the premiums for different kinds of risks and in regard to such other insurance conditions and regulations as are considered applicable to all companies.

The activity of all these fire insurance institutions during the last financial year concerning which statements have been published,* may be seen, in million kronor, from the following summary:

Companies.	Brutto premiums.	Premiums for reinsurances.	Indemnities.		Insurances in force at the end of the year.	
			Brutto.	By reinsurers.	Brutto.	Reinsured.
Swedish joint-stock companies.....	22·07	9·81	14·60	6·78	4,982·92	1,918·63
Swedish larger mutual institutions	3·12	0·35	1·46	0·24	1,585·07	159·62
The mutual companies of the »Läns»	2·23	—	1·69	—	1,772·77	—
Smaller mutual companies.....	1·64	—	1·20	—	1,285·01	—
Total Swedish companies	29·06	9·66	18·95	7·02	9,625·77	2,078·25
Foreign companies.....	2·48	1·22	1·95	1·21	501·29	226·58
Total	31·54	10·88	20·90	8·23	10,127·06	2,304·83

The brutto insurance sum consequently amounted in 1901 to 10,127 million kronor. It has to be observed, however, that most of the Swedish joint-stock companies carry on an important business also in *foreign countries*. At the end of 1901 these foreign insurances represented a brutto value of no less than 2,385 million kronor, of which 567 million kronor were reinsured; as premiums for these insurances were received 14 million kronor, and the compensation paid amounted to close upon 10·21 million kronor. The brutto value of the Swedish insurances should then amount to over 7·7 milliard kronor, which sum, for the finding of the netto fire insurance sum of Sweden, of course must be reduced with the amounts reinsured in Swedish companies or Swedish general agencies of foreign companies and increased

* The statements bear relation to the civil year 1901 for home joint-stock companies and foreign companies, and, as a rule, also for the greater mutual companies; for the mutual companies of the »Läns», as a rule, to the financial year ending within the time from July 1, 1901 to June 30, 1902, and for smaller mutual companies, with some few exceptions, to the financial year ending within the time from July 1, 1900 to June 30, 1901.

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with insurances, possibly taken direct in a company abroad and not reassured in Sweden. — How the brutto insurance sum is divided between real estate and chattels does not fully appear from the statements.

Life insurance, at least as burial help, and several other kinds of personal insurance, in a rudimentary form, occurred in the ancient guilds. But modern life insurance, based on scientific principles, was only introduced in Sweden by the Fire and Life Insurance Company *Skandia* (1855), which then was followed by *Svea* (1867). The first Swedish joint-stock company with exclusive life insurance business (in a broad sense, i. e. life, life-annuity, and capital insurance) was *Nordstjernan* (1872); then came *Thule* (1873), *Victoria* (1883); *Norrland* (1890) ceded its stock to *Skandia* (1898). *Skåne* (1884) also engages in fire-insuring, while *Nordpolen* (1897) is only a life insurance company.

Furthermore, there were 13 *mutual companies* (most of them with guarantee capitals, which are to be successively relieved with collected profits), namely: Allmänna lifförsäkringsbolaget (from 1887), Balder (1887), Oden (1889), Svenska lifförsäkringsbolaget (1891), Svenska arbetarförsäkringsbolaget Valand (1895), Nordiska folkförsäkringsbolaget Union (1895; at the beginning of 1900 absorbed by Valand), Svecia (1898), Lif- och Sjukförsäkringsbolaget Vasa (1898), Allmänna pensionsförsäkringsbolaget (1898), Vanadis (1899; in liquidation since 1901; its stock has been transferred to Valand), Svenska arbetareförsäkringsanstalten Trygg (1899), Brage (1900), and Nornan (1900; now dissolved, stock ceded to other companies). Later on has come Kronan (1902). Besides these there are 25 agencies for foreign companies. The activity of the companies during 1901 and the state of business are seen from the following comparison, in million kronor:

Companies.	Brutto premiums.	Premiums for re-insurances.	Paid compensations. Brutto.	Paid compensations. By re-insurers.	Insurance funds at the end of the year.	Life insurances in force at the end of the year. Brutto amount.	Life insurances in force at the end of the year. Re-insured.
Swedish joint-stock companies	15·82	1·81	7·47	0·73	112·55	479·40	48·67
Swedish mutual companies ..	5·81	0·31	0·81	0·11	15·70	159·30	11·93
Total Swedish companies	21·13	2·12	8·28	0·84	128·25	638·70	60·60
Foreign companies.....	2·15	—	0·60	—	—	56·58	—
Total	23·28	2·12	8·88	0·84	128·25	695·28	60·60

The life insurances in force at the end of the year numbered 202,843. 98,569 of which in the Swedish joint-stock companies, in the mutual companies 89,892, and in foreign companies 14,382. Besides, there are 4,726 life-annuity insurances for a total amount of 1,798,110 kronor per annum. and 1,291 capital insurances for altogether 4,542,786 kronor.

The reservations for profit to the insured made by the Swedish companies the same year, amounted to close upon 1,600,000 kronor, the dividends of the insured not yet paid out, amounted at the end of the year to 2 millions. The development of the Swedish life insurance business is further illustrated by Table 162.

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TABLE 162. *The life insurance business of Swedish companies.*[1] Net.

Average for the years	Premiums. Kronor.	Paid compensations. Kronor.	Insurance funds at the end of the period. Kronor.	Insurances in force at the end of the period.[2] Kronor.	Insurance amount per inhabitant. Kronor.
In 1855	33,833	—	33,483	1,382,300	0·38
1856/60	233,820	66,399	552,508	10,069,997	2·61
1861/65	334,859	121,115	1,203,892	12,531,002	3·05
1866/70	595,743	201,797	2,244,220	23,486,931	5·63
1871/75	1,508,940	369,559	6,240,578	58,948,152	13·45
1876/80	2,559,708	843,014	12,224,764	84,377,828	18·48
1881/85	4,433,236	1,455,629	23,768,849	155,677,025	33·24
1886/90	7,668,032	2,432,461	44,333,121	259,860,821	54·31
1891/95	10,829,806	3,940,730	73,567,205	360,479,566	73·28
1896/00	15,900,403	5,850,356	117,693,408	540,201,865	105·17
In 1901	19,013,049	7,435,506	128,249,631	578,096,848	111·70
» 1902[3]	20,490,000	7,700,000	138,200,000	617,400,000	118·76

The most general *forms of insurance* are the usual life insurance, with premium payment during the whole life-time or only during certain years, and the mixed life and endowment insurance, when the insurance sum is due at a certain age (generally at an age of 55 or 60) or earlier, in case of death. Since about 1890 so-called children's insurances are also written, when the companies' real liabilities of responsibility do not begin till after the insured has reached 20 years of age, though the premium payment as usual commences at the conclusion of the insurance. Among other forms of insurance may be mentioned donation, equipment, partnership, widow's pension, and »karens»-insurance (without medical examination), life insurance for a short time, and insurance of two lives.

For the extension of the insurance business to the lower classes, great efforts have been made during the last years, by the older companies, among which the average insurance sum per insured has consequently shown a strong tendency to go down, as well as by new companies which have made it their special task to give so-called industrial labourer insurance after the example of foreign companies.

As regards the compass of the life insurance taken alone or in connection with other personal insurance, in numerous larger and smaller funds and associations of many kinds, we refer to the end of this work.

The private *annuity and capital insurance institution* of the Civil service and 14 public insurance institutions of the same kind in 1901 paid out a total in annuities of about 461,000, in amassed capital 598,000, and in inheritance and annuity profits 451,000 kronor; the administered funds in these institutions amounted in the same year to about 50 million kronor.

Accident insurance has in Sweden already become introduced to quite a large extent, although the first institution for such insurance, the joint-stock company *Fylgia*, is not quite 23 years old (sanctioned

[1] The statements concerning the insurance amounts only relate to the real life insurances; the other figures, on the other hand, also include life-annuity and capital insurances, etc. — [2] For one company it has only been possible approximately to calculate these netto amounts for the periods 1866/85. — [3] Preliminary statements.

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TABLE 163. *The business of the Swedish Accident insurance companies.* Brutto.

Average for the years	Premiums. Kronor.	Paid compensations. Kronor.	Insurances in force at the end of the period. Total.	Insurances in force at the end of the period. Collective insurances.	Insured persons at the end of the period. Individually insured.	Insured persons at the end of the period. Collectively insured.	Insured persons at the end of the period. Total of insured.
1882/85[1] ...	229,857	96,439	104,323,155	3,777,755	12,988	3,718	16,706
1886/90.....	617,642	331,979	261,698,668	60,464,454	38,337	54,138	92,475
1891/95.....	1,086,093	699,540	302,790,146	90,674,616	37,067	77,395	114,462
1896/00.....	1,508,594	931,472	448,172,219	156,567,000	48,247	133,655	181,902
In 1896 ...	1,219,078	785,991	316,489,394	99,016,558	39,173	84,727	123,900
» 1897 ...	1,353,931	852,545	343,123,380	117,669,198	39,806	101,440	141,246
» 1898 ...	1,527,434	896,692	385,347,930	136,216,220	42,721	119,660	162,381
» 1899 ...	1,676,174	1,041,241	416,099,330	148,775,465	46,216	127,487	173,703
» 1900 ...	1,766,355	1,080,890	448,172,219	156,567,000	48,247	133,655	181,902
» 1901 ...	1,837,557	1,092,510	460,707,420	160,778,414	50,485	136,757	187,242
» 1902[2] ..	1,875,684	1,178,995	470,073,081	161,597,437	52,026	137,269	189,295

July 1, 1881). Besides Fylgia, there were working in accident insurance in 1901 the joint-stock companies *Skandinavien* (since 1886), *Norden* (1888), and *Heimdall* (1900), and the *mutual institutions* Bore (1888), Dalarnes Försäkringsförening (1889), and Gothia (1898). Since 1903 are to be added the joint-stock company *Kronan* (1903) and *Riksförsäkringsanstalten* (National Insurance Office, see p. 1073). Furthermore, 11 foreign companies had representatives and agents in Sweden.

The activity of the Swedish companies since 1882 appears from Table 163. Some dates are given below in million kronor, concerning all the companies in 1901.

Companies.	Brutto premiums.	Premiums for reinsurances.	Paid compensations. Brutto.	Paid compensations. By reinsurers.	Insurances in force at the end of the year. Total.	Insurances in force at the end of the year. Collective insurances.	Reinsurances at the end of the year.
Swedish joint-stock companies	1·50	0·11	0·86	0·07	371·81	137·62	38·16
Swedish mutual companies...	0·34	0·02	0·23	0·02	88·90	23·16	8·62
Total Swedish companies	1·84	0·13	1·09	0·09	460·71	160·78	46·78
Foreign companies.....	0·24	0·05	0·09	—	103·42	6·04	36·31
Total	2·08	0·18	1·18	0·09	564·13	166·82	83·09

The whole number of persons insured amounted at the end of the year to 198,444, of whom 146,235 in the Swedish joint-stock companies, in the mutual companies 41,007, and in foreign companies 11,202. Collectively insured were (on 3,587 insurances) altogether 139,712 persons, of whom the three groups of companies number respectively 118,269, 18,488, and 2,955.

In regard to **other branches of insurance** represented in our country, we will only give a few figures here. — According to the report of the insurance inspector for 1901, there were engaged in **cattle insurance** 257 companies and associations based on mutual principles, among which one embraced

[1] The business of Fylgia from Nov. 7, 1881 to the end of the year is here put down to the year 1882. — [2] Preliminary statements.

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the whole of Scandinavia (Skandinaviska kreatursförsäkringsbolaget, one of the largest in the world of its kind); 13, one or two Läns each; and 243, smaller territories. According to the statements (not quite complete) which have been sent in, nearly 199,000 horses and 123,000 head of cattle were insured at the end of the financial year for respectively 76·3 and 14·7 million kronor, and during the same year indemnities had been paid for 4,577 horses and 701 cattle with respectively 1,310,125 and 64,593 kronor. **Agricultural hail insurance** was given in 1901 by 7 mutual hail insurance companies (Allmänna hagelskadeförsäkringsbolaget, the companies of the Läns of Uppsala, Östergötland, Skaraborg, Örebro, Vestmanland, and of the provinces of Skåne and Halland), and by 3 mutual fire-insurance companies (those of the Län of Kronoberg and the parishes of Markaryd and Slätthög); the statements from the first seven show 14,621 insurances, valid at the end of the financial year, for a total of 36·9 million kronor, and 201 hail indemnities paid during the same year (with 27,650 kronor). **Frost insurance** was given by the mutual company Sveriges frostförsäkringsbolag, established in 1901; at the end of its first business year, the company had 570 valid policies, corresponding to an amount of 932,820 kronor.

Plate glass insurance was given in 1901 by 10 institutions; 7 of these were home companies, viz., Göteborgs fönsterförsäkringsbolag, Svenska glasförsäkringsaktiebolaget (1884), Aktiebolaget Stella (1898), the aforesaid Skandinavien, and the three joint-stock companies for burglary and theft insurance, etc. During the year, glass insurances were given for about 4·8 million kronor, nearly 97,000 kronor were taken in premiums, and about 49,000 kronor were paid out in indemnities. — **Guarantee insurance** was carried on by Aktiebolaget Tre Kronor since (1890), in which company there were in due force, on December 31, 1901, 1,358 insurances for a total of 3·6 million kronor. 46,362 kronor were taken in premiums, and 25,730 kronor were paid to the policy-holders. — **Burglary and theft insurance** was carried on in 1901 by the Swedish joint-stock companies Securitas (since 1896), Iter (1898), Idun (1898; now dissolved), and Skandinavien, and by many foreign (among which several accident insurance) companies. — Within the domain of **sick insurance,** there worked the aforesaid Lif- och sjukförsäkringsbolaget Vasa (in combination with life insurance), Försäkringsanstalten Brage (1899), and some foreign companies (in combination with accident insurance). (Concerning Sick and Burial funds in activity, see p. 1077). — Companies occupied exclusively with **reinsurance** in 1901 were: in life and fire insurance 1, in fire insurance 3, and in marine insurance 3, or together 7 Swedish joint-stock companies.

For an advancement of the development of Swedish insurance there work two **associations,** both in Stockholm, namely Försäkringsföreningen and Försäkringsmannaföreningen. The periodical »Försäkringsföreningens Tidskrift» has been edited since 1878. Other *organs* in this line are the insurance papers Gjallarhornet and Assurans.

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XV.

SYNOPSIS OF INDUSTRIAL LEGISLATION.

The trades — from olden times tied to the towns and fenced round by oppressive ordinances — were liberated in the middle of last century by abolishment of the guilds on Dec. 22, 1846. Full acknowledgment is given to the principle: liberty of trade, in the chief Statute Law on this subject, issued June 18, 1864.

General decrees concerning the following of a trade.

For the *right of carrying on manufacturing business, trade, or other employment* a Swedish man or woman is generally not required to produce any certificate of professional skill or other qualifications, as long as they be in possession of civil rights and full-aged mastery over themselves and their property; nor is a license needed for this purpose but simply a notice of going to carry on a trade.

But not even this is always necessary. Work that is carried out, either without the purpose of selling the goods manufactured, or else without specially engaged workmen, falls outside and beneath the rule. Independent of any condition or intervention, any one has consequently the right of making commodities for daily use, and of making manufactures or handiworks for sale, as also of carrying on any employment as a trade, as long as this be done without the help of anybody but a wife, or children living at home.

Just as freely it is allowed for farmers, with the help of their wives, children living at home, and servants formally engaged, to make for sale such articles of manufacture or handicraft as can be an object of their home industry.

If again the manufacture or occupation is driven on a larger scale with helpers to a greater extent than above mentioned, the rule comes into force. In accordance with the conditions for trading, this rule requires a certificate of character and judicial majority as well as a notice and a certification of the validity of those conditions, or else, where

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this may be ordained, an announcement of firm. The notice is delivered to the same authorities that receive announcement about trading business, with the exception, though, that he who wishes to drive a blast-furnace or foundry-works, a forge, a manufactory or other establishment intended for the utilization or improvement of products out of the mineral kingdom, and thus not to be looked upon as a trade — has to give notice to the Mining department, i. e., the Board of Trade.

From the stipulation about possessing the mastery over one self and one's property, the same exceptions are made as for commercial business.

The occupation of a tradesman may be carried on for a year after his death to the profit of his heirs.

The qualifications stipulated are, of course, necessitated by the care for those with whom the tradesman enters into connections or who are engaged in his service; the notice is required as a control on his possessing those qualifications and as a means for the respective authorities to get information about his trade for the sake of taxation and for statistic purposes; it, moreover, facilitates the inspection to which the trade is subject in certain cases, especially concerning people engaged as assistants in it.

Special decrees for certain trades.

For special occupations and trades *other and more rigorous decrees* are in force, justified by the care the state devotes to the life, health, and property of its citizens, or else by other causes arising from the special control considered necessary to be exercised over a trade.

The state requires a guarantee of *professional skill* for the running of such a factory where chemical work is needed for the fabric, and where a faulty procedure might occasion a fire or endanger life and health. Such a factory must not be run by anybody who has not himself the duly certified professional skill required to conduct such an establishment, or else can prove that he has for that purpose engaged another person of equally testified insight in the trade. Certificates about this must be subjoined to the notice.

From the reasons here given, special decrees are in force, chiefly concerning the make or refinement of *inflammable oils* (Royal ordinance of Nov. 26, 1875); the manufacture of *explosive goods* (Royal ordinance of Nov. 19, 1897); the make of *poisonous matters*, particularly arsenious acid, for the producing of which permission from the King is required; and specially also other poisonous substances (Royal ordinance of Jan. 7, 1876); preparation of *medicine* (apothecary's trade, Royal regulation of Aug. 11, 1819 a. o. statutes). Certified professional skill is likewise required for carrying on the profession of a surgeon or barber-surgeon.

A special legislation also exists concerning the manufacture of *margarine*, *margarine cheese*, and *artificial suet*, in accordance with the ordinance of July 1, 1898 about control on such fabrics and about dealing in them; likewise for the make of *brandy* and distillation of it at distilleries, according to the ordinance of July 13, 1887. These fabrics are subject to public inspection, the former for reasons of health and to the protection of dairy-farming against illoyal competition, the latter for reasons of taxation.

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The taking of certain measures when establishing a manufactory is also required in some other cases. For the erection of a herring saltery and train-oil manufactory permission is required conformably to § 27 in the Fishery ordinance of June 29, 1852. The Board of Health ordinance of Sept. 25, 1874 has likewise some claims concerning the erection as well as the arrangement and the driving of certain manufactories or establishments dangerous to health. Printing-offices must only be erected in towns or boroughs or else within a certain distance from them (Press Law).

Some other trades besides, form exceptions from the general trade legislation; so does, for instance, organ-building, for which an acquired insight and expertness are required, likewise the chimney-sweeps' trade in town.

A tradesman is bound by certain decrees to protect the workmen he employs in his business. The legislation on this point, the **law about protection of workmen,** is to be found in the ordinance about liberty of trade; the law concerning protection of crafts-men against danger, issued May 10, 1889; the decree on precaution against phosphor necrosis among workers in match-manufactories, of Dec. 9, 1896; the statute regarding employment of minors in manufactories, trades, or other occupations, of Oct. 17, 1900; as also in other ordinances. This legislation will be treated below under the heading Labour Legislation.

Business Associations.

The Swedish association statutes have lately been subject to a revision. There is a distinction made between different kinds of associations.

By **a commercial company** is understood a union of two or more into a joint firm for the purpose of carrying on commerce or other trade, the driving of which involves the obligation of keeping business books (Law of June 28, 1895). That duty is incumbent on everybody who has made it his business to drive wholesale or retail trade or to manufacture or refine goods for sale, whether this be a private person, a company, or a union (Royal ordinance of May 4, 1855, according to Law of June 28, 1895). A commercial company can acquire judicial rights and take duties on itself, as well as sue, prosecute, and defend before the court and other authorities. The rights and duties of the associates during the existence of the company, are settled by compact. Each one of them, as a rule, has the right to take measures regarding the administration of the company's concerns. *Profit and loss* are divided among the associates per capita. If a certain principle has been agreed upon for profit or loss alone, this principle is to be valid at the distribution of both profit and loss. An associate is not bound, if urged upon by other associates, to contribute anything above the sum once settled.

Where not otherwise agreed, each one of the associates, as a rule, has a right to represent the company. For the liabilities of a commercial company the associates are responsible each for the others jointly and separately, just as for a debt of their own (Law of June 28, 1895).

Special provisos are in force concerning *commercial companies with a limited responsibility devolving on one or more of the associates*, — so-called *commandite companies*. What characterizes that kind of company is the re-

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servation made by one or more (not all) of the associates in a commercial company of not being responsible with more than he or they have invested or undertaken to invest in the company. The firm of such a company must contain the words »commandite company». Where not otherwise agreed, a commandite shareholder must not partake in the administration of the company's concerns and is, moreover, excluded from the competence of representing the company (Law of June 28, 1895).

By **partnership** is meant the association of two or more for a certain enterprise or for a continued activity, without this union being a commercial company. If the partnership is entered into the register of trade, it will be considered a commercial company. A partnership cannot acquire judicial rights or take duties upon itself, nor yet appear before court or other authority.

The mutual rights and duties of the partners, during the existence of the partnership, are settled by compact. For administrative measures the consent of all the partners is mostly required. Profit and loss are divided in the way stipulated for a commercial company. By an agreement made on behalf of the partners, under the name by which all the partners are represented, a single partner cannot be authorized or bound in reference to him with whom the agreement was made, unless he himself has partaken in it. If several partners have participated in the appointment, they will enjoy equal rights and duties per capita when nothing else was agreed upon at the occasion. If at an agreement a denomination is used implying a vaster responsibility, those partners with whose consent this was done are responsible each for the others jointly and separately. If a partnership carries on a trade involving the duty of keeping business books, the responsibility will for that reason be extended (Law of June 28, 1895).

A **joint-stock company** can be constituted by those who wish to carry on a joint activity by contributions in money or property, without having to be responsible for the liabilities arising from this undertaking with more than each has invested or is bound to invest according to the stipulations in the law about joint-stock companies. A joint-stock company must be registered; before this be done, it cannot acquire any rights or take any duties upon itself, nor yet sue, prosecute, or defend before the court or another authority.

The contributions are divided into shares of equal amount in Swedish money and are inseverable against the company. If, without alteration of the memorandum of association, the joint capital is to be increased or diminished, the minimum capital must not be less than a third of the maximum one. The joint capital, or, in the case mentioned, the minimum one, must not be less than 5,000 kronor, nor yet a share have a nominal value of less than 50 kronor. Where the stock does not exceed 10,000 kronor, a share is allowed to be of smaller value, the lowest being 10 kronor. The scrips are issued to a certain person, but in certain cases, by grant of the King, they can be payable to the holder.

Those who wish to found a joint-stock company must draw up a *foundation deed* containing certain main principles for the undertaking intended. This is the first measure required. The deed is to be signed by the founders, who must be five at least and resident in the kingdom. In case the founders themselves take all the shares, the company is formed by this agreement. If the capital is partly to be procured from other people by subscription, they have to issue an *invitation* to the public for the purpose, which, however, must not be done till the foundation deed in two copies has been presented to the county Government Board of that län where the managers mean to settle, and one of these copies has been returned with a certificate of its having been presented. The invitation is issued according to rules stipulated, and, to be valid, the subscription should be written on the paper of invitation, unless it be written by one of the founders.

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A meeting with the subscribers for constituting the company should be held within a year from the time of presenting the foundation deed. If at the meeting is proved that the joint capital has been fully subscribed to, the question on forming the company is treated. It is considered to be constituted if this has been decided unanimously or by a majority of votes running up to a fourth at least of the whole number of subscribers, the founders inclusive, with a joint capital of no less than a fourth of the total fund.

After the company has been formed, a *memorandum of association* must be accepted, containing stipulations on certain subjects already touched upon in the foundation deed; moreover, a board and reviewers have to be elected. — Out of the annual profit of a joint-stock company, at least 10 % must be put by for a reserve fund. The right of a shareholder to partake in the administration of the company's concerns is exercised at the meetings of the company. The joint-stock company is represented by the Board, consisting of one or more members. The members are to be resident in Sweden and to be Swedish or Norwegian subjects, unless, in some special case, the King permits the Board partly, at most to a third of the total number, to consist of foreign subjects or else Swedish or Norwegian subjects residing abroad. Members of the Board must not be elected for more than five years.

An agreement in writing entered upon for a joint-stock company must be signed on its behalf and in the name of the firm (Law of June 28, 1895).

Special ordinances are in force concerning banking, railway, and insurance companies. Their memoranda of association are sanctioned by the King.

The capital stock of *banking companies* must amount to one million kronor at least, but for a less extensive business, a smaller capital stock is allowed, not below 200,000 kronor, though. If the memorandum is sanctioned, the King gives permission for the banking business to be carried on for 20 years at most, and beyond that, to the end of the civil year then running. The shareholders in a banking company should be Swedish subjects, no less than 20 in number. They are not responsible for the liabilities of the company with more than each has invested or undertaken to invest (Law of Nov. 19, 1886, concerning banking companies).

As to *railway companies* according to Law of March 5, 1897, and *insurance companies*, according to Law of June 28, 1895, the law about joint-stock companies is valid in the main, with the deviations resulting from the memorandum having to be sanctioned by the King. The King puts the conformity of the memorandum with the law above mentioned to trial, as well as with law and ordinances in general; the same is done concerning railway companies, supposing the sanction meets with no drawback for the sake of common weal. As to the extent and nature of the insurance company business, the King decides whether and how far special stipulations be needed, either about surety for the fulfilling of the shareholders' liabilities or about control on the observation of instructions given, or else with some other object in view. The circumstance of a shareholder's being bound to contribute a little beyond the amount subscribed by him, a duty not customary in ordinary joint-stock companies, makes no hindrance for sanctioning the memoranda of insurance companies. (Law concerning these, of June 28, 1895).

A special kind of associations are those for **economical activity** with the purpose of procuring the members victuals or other necessaries, of selling products of their work, of procuring dwelling-places for them, or, in any similar way, to promote their interests. Such an association can be registered when consisting of five members at least and having established regulations and chosen a Board in accordance with the law concerning this matter; before being registered, it cannot appear as an independent artificial person. The association

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is represented by a Board, consisting of one or more members of the union. A member of the Board must be a Swedish or Norwegian subject resident in Sweden. Special stipulations are in force concerning such associations with personally responsible members. (Law about registered associations for economical activity, of June 28, 1895).

Besides, people of the same trade or different ones have a right to decide for themselves whether to form and constitute an **association** for their trade concerns and, when regulations have been established for such an association, to get them sanctioned by a public authority. (Ordinance about liberty of trade, §§ 13 and 14).

Register of Trade.

Swedish legislation requires the entering on special lists, kept with some public authority, of the name under which tradesmen, private persons, or companies intend to carry on their business, and which they in signatures concerning it mean to write, or what is termed **firm.** Such a list, called *register of trade*, is kept in Stockholm at the office of the High Governor, in other towns with the magistracy or town government, and for the province with the Governor of the Län.

To be entered upon the register of trade is compulsory for any one who wishes to carry on commerce or trade the following of which involves the duty of keeping business books. From the obligation of declaring this intention are exempt: owners and fitters-out of ships, who are subject to a special registration duty for their vessels; joint-stock companies, who have to give notice to the central joint-stock company register; associations for economical activity, which, when bound to be registered, give notice to special, local association registers; as well as private banks of issue. Partnerships can be entered on the register of trade and are then on a par with commercial companies.

The firm of a private tradesman is to contain his family name, with or without his Christian name, and in the firm nothing must be entered intimating its being possessed by a company or an association.

The firm of a commercial company, when all the co-partners are not mentioned by name in it, must contain the name of one among them with an addition implying that there are several associates.

The declaration is to be made in writing before the carrying on of the trade has begun (Law about register of trade, firm and procuracy, of July 13, 1887, with alterations of June 28, 1895; Royal proclamation about keeping a register of trade etc., of Nov. 4, 1887, with alterations).

The *joint-stock company register* is kept by the Patent and Registry office, and declaration to this register is compulsory for all joint-stock companies. Banking, railway, and insurance companies are registered where the memorandum of association has been sanctioned; other companies ought to declare for being registered immediately after the memorandum is accepted. (Law about joint-stock companies, registering of banking companies, and joint-stock insurance companies, of June 28, 1895; Law containing special stipulations for railway companies, of March 5, 1897; Royal proclamation about the keeping of a joint-stock company register etc., of May 18, 1896; Royal proclamation about duties to be observed by joint-stock companies whose plan has been sanctioned by the Government, concerning their being entered upon the joint-stock company register, of May 18, 1896).

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The *association registers* are kept with the Governors of the Läns (Law of June 28, 1895 and proclamation about keeping association registers etc., of May 18, 1896).

What is entered upon the various registers is announced in the daily papers. Through the Patent and Registry office a synopsis is annually issued containing informations published by the registers of trade, of joint stock companies, and of associations. (Proclamation on this subject, of June 5, 1896).

The holder of a firm entered upon a register of trade can give notice to it of *procuracy*, i. e., the authority conferred on a certain person of acting on his behalf regarding the business and of signing his name. Procuracy in writing entitles the procurator, in person or by proxy, to plead his principal's cause in court and before other authorities, as well as to come to terms on his behalf. Without authorization a procurator must not, however, strip his principal of his landed property, nor yet allow it to be mortgaged. A procuracy involving a restriction of the rights prescribed, must not be registered. (Law about firms, §§ 25—32).

Patents.

In Sweden, as in many other countries, the origin of patents can be traced to the *privilegia exclusiva* which the government in olden times granted as a reward and encouragement to a person who had either made some discovery himself which could be advantageously applied to home industries, or had started a business that, up to that time, had not been carried on in Sweden.

At the Riksdag of 1809 a Bill was introduced for the regulation of conferring privileges for inventions, and on April 28, 1819, the first Patent Law in Sweden was passed, although the old title »*privilegia exclusiva*» was retained in the Act. For many reasons, but perhaps chiefly in consequence of the test required by this statute, concerning the novelty of the inventions, dissatisfaction with the new law soon arose, and, after repeated proposals on the part of the Riksdag, a new statute was passed on Dec. 13, 1834, in which the word privilege was superseded by the modern denomination patent, such being, according to this statute, conferred without test of novelty. In the Swedish Patent Act of 1819, as well as in that of 1834, a clause was found to the effect that no patent could be contested unless a suit had been brought against it within a stated time. This enactment, which has of late years again begun to win adherents, and has been incorporated in the New Patent Laws of the German Empire, was excluded from the subsequent Patent Law, issued August 19, 1856.

In proportion as industrial activity in Sweden rapidly developed in the 6th and 7th decades of the past century, and inventors to a greater extent began to seek the protection of patents, defects became more conspicuously evident in the patent-system resting on the regulations of 1856, and the demand on the part of industry grew louder for a more effectual and modern patent-system. After thorough preparations a proposal was at last formulated, which was accepted by the Riksdag of 1884, and received the Royal Assent on May 16, that same year. This statute, which came into force on January 1, 1885, is the now existing Patent Law. It has since, in certain parts, undergone modifications for the purpose of rendering the protection accorded by patents more effective, and facilitating the obtaining and maintenance of patents.

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TABLE 164. *Patents, granted in Sweden during 1885/1900.*

Classes of industry.	The inventor domiciled		Total.	Classes of industry.	The inventor domiciled		Total.
	in Sweden.	abroad.			in Sweden.	abroad.	
Mining and metallurgy	84	299	**383**	Washing, mangling, ironing	33	30	**63**
Improvement of metals	157	271	**428**	Scavengering and hygienics	125	146	**271**
Manufacture of metals	296	275	**571**	Construction of roads and hydraulic architecture	163	290	**453**
Wood and cork industries	193	192	**385**	Ship-building and Navigation	82	136	**218**
Wood-pulp and paper industries	64	250	**314**	Other transport industries	333	464	**797**
Textile and leather industries	80	209	**289**	Drawing-engines	59	72	**131**
Clothing industries	183	234	**417**	Steam boilers and other generators	61	141	**202**
Building industries	127	151	**278**	Steam-engines with accessories	67	73	**140**
Clay, brick, and cement industries	33	94	**127**	Electric generators and motors	35	200	**235**
Stone and asphalt industries	15	35	**50**	Other motors	73	130	**203**
Glass industries	20	33	**53**	Transmission of power	22	95	**117**
Furniture and house-implement industries	267	109	**376**	Parts of engines	137	159	**296**
Gas-making and gas-lighting	63	251	**314**	Military matters	75	282	**357**
Other lighting industries	52	192	**244**	Fire-organization, etc.	46	31	**77**
Heating and refrigeration	259	269	**528**	Telegraph and telephone system	48	129	**177**
Match-industry	47	73	**120**	Other signal systems	58	70	**128**
Dairying	174	129	**303**	Instruments and measuring apparatus	132	176	**308**
Bakery-industry, etc.	120	156	**276**	Reproduction industry	124	237	**361**
Beer, spirit, and sugar industries, etc.	30	176	**206**	Crushing, mixing, sorting	57	79	**136**
Fishery industry	24	7	**31**	Sundry industries	173	217	**390**
Farming and cattle-rearing, etc.	312	159	**471**				
Explosive industries	21	46	**67**				
Other chemical-technical industries	140	434	**574**	Total	**4,664**	**7,201**	**11,865**

Patents are granted in Sweden for new inventions of industrial products or of special methods for their manufacture. If the invention relates to food or medicine, protection cannot be accorded for the article itself, only for a special mode of manufacturing it. Inventions which are contrary to law and morals are excluded from protection. None but the inventor or his legal representatives are entitled to a patent.

Before a patent can be granted, the originality of the invention is tested by the **Royal Patent and Registration Office,** the application documents are kept accessible for inspection of the Public for two months, and any one during that time is entitled to protest against the granting of the application.

The term of patent rights is in Sweden 15 years, reckoned from the day of application. As in most other countries, annual *fees* have to be paid on penalty of the patent expiring. In Sweden, however, these fees are very moderate. 20 kronor (à 1·10 shilling) are paid on application, and afterwards 25 kronor a year up to the sixth year, 50 kronor for each of the five succeeding years, and finally 75 kronor for each of the last five years. Thus, the total sum required for main-

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taining patent rights for the whole term of the patent, amounts to 745 kronor (£ 41). In addition to this, to be absolutely accurate, there is a stamp of 10 kronor for the letters patent. The Patent Law of Sweden allows no reduction of these fees or dispense from them.

In Sweden, as in most other countries, the patentee is certainly in duty bound to *practise* his invention *within* the country; but, on the strength of the amendment of May 9, 1902, a significant alleviation for the patentee was brought about, inasmuch as he need no more run the risk of losing his patent in case he should not fulfil his legal duty of putting it into practice; he can in that case by judicial order be enjoined to let another person carry out his invention against a compensation; thus, it may be said that in Sweden a transition has been effected towards a regimen of *licenses of co-ercion* on chiefly the same principles as those applied in England. The object aimed at was thus to remedy the constantly repeated complaints about the unreasonable demands of the old decrees without a corresponding benefit for the industry of the country; and as far as hitherto can be judged, it seems as if the alteration brought about concerning the duty of putting an invention into practice had gained approval from those concerned and as if it were going to entail the advantage desired.

Table 164, page 1057, gives a summary of the number of patents granted by the Patent Office. With slight fluctuations this number has steadily increased from 206 in 1885, and 464 in 1886, to 1,710 in 1901, and 1,674 in 1902. The year 1897 is remarkable, inasmuch as the number of patents rapidly rose to 1,149, which increase is due partly to the official Exhibition of Art and Industry held that year in Stockholm, partly, and in a high measure, to the large number of inventions — about that time patented in all parts of the world — into the cycle industry, and also in the carbide and acetylene industries.

Trade Marks.

After the gradual rescinding of most among the ancient Guild laws or statutes referring to manufactures and handiwork, wherein numerous provisions were found in regard to stamping and marking goods, manufacturers and tradesmen were allowed, by the Royal statute of June 13, 1862, if they thought fit, to set their own stamps or marks on their goods, and publicly to advertize the character and appearance of these stamps or marks. The protection which a tradesman could expect for his trademark, on the strength of the Royal statute of 1862 and certain clauses relating to the same in the Criminal Law, was, however, very uncertain, and in proportion as trade developed and a better market for the productions was found, the inconveniences of a defective protection by trademarks made themselves more and more felt. To remedy these defects a committee was appointed by the Government, with the object of providing a more practical protection to trademarks and factory stamps, but its proposals did not lead to any further results as meanwhile a new proposal had turned up. On the initiative of the Swedish Riksdag measures had been taken towards instituting legislation in common to the three northern kingdoms, Sweden, Norway, and Denmark, and

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had given rise to uniform laws of exchange for these three states. Now it was desired to continue this newbeaten path also in respect to legislation concerning trademarks, and, on that account, a committee in common was appointed, which elaborated a proposal, uniform in all essential respects, about trademark enactments for the three countries just named. After having been somewhat modified in certain respects, the Swedish proposal was accepted by the Riksdag in 1884, and came into force on January 1, 1885, and is still valid, with the alterations introduced by the law of March 5, 1897.

The right to a trademark, according to Swedish law, is acquired through the *registration* of the mark. Everyone within the kingdom who carries on manufacture, agriculture, mining, commerce, or any form of trade, is entitled by registration to acquire the exclusive right to use a special trademark, in order to distinguish his goods, in public trade, from those of others. The registration need not be restricted to certain kinds of goods. Marks are excluded from registration in which by the applicant unduly is inserted the name of another person or firm than that of the applicant himself, or the name of another's real estate, or else which contain public arms or stamps, or representations which could give rise to offense, or which entirely resemble other marks already registered, or which present so great a likeness to such marks, though different in certain parts, as to be easily mistaken for them. Neither can a trademark be registered which consists only of figures, letters, or words which are not so distinguished by their peculiar form that they can be considered as a figuremark. If the word can be considered as a specially invented name for certain kinds of goods and is not intended to give information about the origin of the articles in question, or their nature, destination, amount, or price, its registration is, however, permitted.

The registration fee is 40 kronor (£ 2·2) and the term of protection 10 years, but this can be renewed each time for a period of ten years on the payment of a renewal-fee of 10 kronor (11 shillings).

Foreign manufacturers are entitled to register and protect their trademarks only if they belong to such foreign states as have entered into a special treaty with Sweden upon the matter. They are obliged, as in the case of a patent, to have an agent resident within the country who is authorized, in the place of his principal, to be responsible in all cases referring to the trademarks, which are not protected to a greater degree, or for a longer term, than in the foreign country in question.

Gold, *silver* or *tin* articles must be provided with the official stamp — three crowns — but, besides, the article must be provided with the name of the manufacturer, of the place of manufacture, and also the date, before the controlling stamp can be affixed. The control of the official stamping belongs to the Royal Assay Office, which was established as early as 1752. For further information compare page 1023.

In Sweden the stamping or branding of *iron* and *steel goods* is also compulsory. Every smelting factory for pig iron or for working it into wrought iron or steel, or for any other coarse iron manufacture, must have a registered brand such as prescribed in the law on trade marks, with which its manufactures must be marked, and penalties are fixed both for omissions to stamp iron and steel goods, and for the use of brands belonging to other iron works.

Designs and Models.

The committee whose preliminary work forms the basis of the present statutes regarding patents and trademarks, also received instructions from the Government to prepare a bill for the purpose of affording efficient protection against reproduction of designs and models. While the question concerning laws for patents and trademarks was settled as early as 1884, models and designs have, on the

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ground of energetic opposition chiefly from textile manufacturers, remained in want of legal protection until January 1, 1900, and the protection now given only refers to one branch of industry — the *metal trade*, which had made repeated proposals for protection, and of whose opinion in the matter there could, therefore, be no mistake.

The Swedish law respecting designs has regard only to so-called *ornamental designs* and models and is based upon the principle of a preceding examination of the originality of the design. Those entitled to registration are inventors of designs or their legal representatives, and registration is granted both to Swedes and to foreigners without respect being paid to the degree in which Swedes can claim a corresponding advantage abroad. If the applicant be not resident in the country, he must have a representative entitled to answer for him in everything respecting the right of protection. Protection embraces a term of five years dated from the filing of the application, and the law does not mention any extension of the term. The fee for registration is 10 kronor, once for all. The registration is public and the general character of the design must be given in the application, which must also be accompanied by three copies of a representation of the design or of the model.

Foreigners.

Considering the rights due to *foreigners* of carrying on trade in Sweden, a number of stipulations can be gathered from the account above. These and others referring to the subject will here be brought together in one place. Except for a Norwegian subject, it depends, as a rule, on the consideration of the King whether a foreign man or woman be allowed to carry on trading or manufacturing business, handicraft or other work in the Kingdom.

An application for that purpose is sent in to the Governor of the Län together with a certificate of majority and of good character as well as a communication about a solvent bondsman or other surety for the taxes being paid to State and community during three years. In that application the town or place must be mentioned where the work is to be carried on. When such are found necessary, further informations about the applicant as well as the respective explanations of the party concerned are requested by the Governor of the Län, who then returns the documents to the Financial Department and expresses his own opinion on the matter. When the question is about driving a blast-furnace or a smelting-house, iron-works, a manufactory, or other works aiming at the utilization and refinement of products out of the mineral kingdom, and consequently not to be considered as handicraft work, the application is sent in to the Board of Trade and not to the Governor of the Län.

A license to carry on commerce or other trade also involves the right of sending goods from one place to the other within the kingdom, as also to and from foreign parts, but does not imply the right of peddling or of being a pedlar's assistant. Nor yet does it involve the right to sell off or to assist at a sale without the Government's having granted permission on the strength of a treaty entered into; and such a permission is applied for in the same way as for a commerce or trade. But, without special license, a foreigner is allowed to have shares in a ship, provided these do not exceed a third of the burden and that he be not the principal owner.

Without special license, a foreigner may also be shipped on a Swedish vessel, with the observation, though, that when being shipped in the kingdom, no more than a fourth of the crew must be foreigners. A foreigner must not be captain

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or mate. During the herring-fishery along the coasts of Bohuslän and after notice given to the county government, the police, or the magistracy, a foreigner is allowed to buy up fish for export, but without the right to other treatment of it than required for its being kept fresh during the transport.

A foreigner must not be a member of the Board for a Swedish joint-stock company, unless the King, in some special case, has granted his permission, which must not, however, be given to more than a third of the members. In the Board of a registered association for economic work, a foreigner must not be a member, nor yet shareholder in a banking company. The right for vessels of foreign nations to carry on trading in the kingdom is dependent on a special permission given in a treaty, as mentioned above.

From a surety having been requested for the taxes of a foreigner to State and community during a certain time, follows that a foreigner who, after the lapse of that period, wishes to avail himself of the license given, must renew the surety before the expiration of the time fixed. Each time, a surety for three years must be presented to the Governor of the Län.

A **Norwegian man or woman,** registered as resident in the kingdom, are entitled to carry on commerce or other trade under the conditions stated for Swedish subjects; they have a right to shares in ships without being restricted to a third of the burden; Norwegian men can without any hindrance be shipped on Swedish vessels and can also be engaged on them as captains, mates, or engineers on the condition of having passed the examinations required for such an employment. They can be members in the Board of a joint-stock company and of registered associations, but not shareholders in a banking company. That Norwegian vessels have the same right as Swedish ones to carry on trading on Swedish fair-ways, has been mentioned above.

Measures and Weights.

The ancient system of measures and weights — of multifarious variety —, for the regulation of which several different proposals have been made ever since the days of Gustavus III, was at last, in 1855, unified and transformed by means of strictly adhering to the decimal system. The new measures then ordained had not, however, time to be adopted everywhere before being superseded by the **meter system,** accepted at the Riksdag of 1876.

The meter system became compulsory only in 1889. As early as 1869 it had been adopted for medicinal purposes, and in 1873 at the Post. At the Customs and the Railway the meter system was introduced in 1881.

The ordinance about measure and weight now in force is of Oct. 9, 1885. In commerce, or else when goods are to be delivered or accepted by measure or weight, no other implements for measuring or weighing must be used than such as have been **assayed** in the kingdom. For the assay the kingdom is divided into 53 districts of assay, each with an inspector of weights and measures and legally commissioned adjusters. The superintendence is exercised by the Comptrol and Assay Office of the Financial department, which office alone assays so-called precision instruments.

Sweden sends representatives to the *International bureau for measures and weights* established in Paris since 1875, which has to provide States having adopted the meter system with a standard measure (metric prototype), as also to settle certain technical details for the attaining of full uniformity.

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XVI.

LABOUR LEGISLATION AND SOCIAL STATISTICS.

Some of the questions that would naturally fall under the above headings have been already treated of in the foregoing pages, more especially in that part of the work which immediately precedes; as, however, these topics are regarded with keen and especial interest at the present time, it may be well to devote some attention to them here, and to give a short summary of what has been done in Sweden; at the same time the opportunity is embraced to attach to the account notes upon kindred matters for which no place has been found in other chapters.

1. LABOUR LEGISLATION.

The labour legislation of recent times owes its origin to the condition of things produced by the rapid advance of manufacturing industry; it is naturally most extensive in those countries where agriculture and other means of livelihood have been to the largest extent supplanted by mechanical industry. The manufacturing industries of Sweden being of comparatively late growth and their compass not yet having attained to that of agriculture, it follows that labour legislation still very largely rests upon the ancient economic conditions as its basis, and in consequence often proves inadequate for the needs of the present day with its new order of things. To take one example: it is an easy matter for a working man or a servant, not only in the towns but even, though to a less extent, in the country districts, to evade the stipulations of the law concerning the relations of servants to their employers, which are in many cases quite antiquated and out of date, by avoiding to enter service under any of the particular forms therein laid down. As far, however, as agricultural employments especially are concerned, the laws of an earlier time are still of a sufficiently binding

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and practical nature to warrant some detailed reference to them being made here, in addition to a review of the legislation of later times, to which will be attached an account of the social movements closely connected with them.

Hiring of Servants. Obtaining of Situations.

Hiring of Servants. Agreement for hiring servants is regulated by the law of November 23, 1833, and the modifications subsequently made therein. According to this law, the servant is hired for a year at a time, the year commencing October 24, except in Stockholm where the duration of service is six months, the changes to be made April 24 and October 24. The master of the house has to give the pay agreed upon (board and lodging, wages) and to take care of the servant in case of sickness.

The servant is to devote his work exclusively to the master of the house. The agreement for hire must not be broken, unless by mutual consent, if the servant has been duly hired and has received his »retaining fee» (Städja).

We here only give these intimations regarding the matter, since the provisions of the law are antiquated, inasmuch as the servants themselves may evade the provisions of the law by not taking retaining fees, which is also frequently done. In 1898, a *Royal Committee* was appointed on demand of the Riksdag, for the purpose of elaborating a new law in this respect. The Committee presented a memorial in 1900, but the matter is not yet settled.

As regards commercial and industrial workmen, the above mentioned law is not applicable. As to working agreements in this case, there are but a few special provisions made, e. g., in the law of 1864 concerning extension of the liberty of trade.

With regard to **sailors,** there are special detailed regulations, of which previous mention has been made above (p. 972).

Obtaining of Situations. The regulations in force on this subject date back as far as to the Royal rescript of Nov. 28, 1884, dealing with the keepers of registry offices for the obtaining of situations.

For leave to carry on the business of a registry office for supplying employer with servants and obtaining situations for servants, application has to be made to the Governor of the Län; permission can only be granted to Swedish subjects of good repute and in a position of independence and solvency, who are known to be orderly and methodical and to possess other suitable qualifications. The license may be withdrawn at any time. Permission to employ agents can likewise be granted, and may in like manner be withdrawn.

If the registry office arranges about situations *beyond the bounds of Sweden and Norway*, security to an amount of 1,000 à 5,000 kronor (£ 55 à 275) must be found, which will not be returned until two years after the close of the last year during which the activity was held. If any claim for compensation be lodged, the amount of such claim shall be kept until the question be settled for or against the claimer. When a situation is procured, the prospective holder shall produce a certificate of good conduct from his or her last place of employment, and also two copies of a contract to be entered into by the keeper of the registry office and the applicant for the situation. The terms of the contract shall embrace an engagement on the part of the keeper of the registry office, for a term of six months at most, to pay the whole of the emoluments accruing to the applicant for a situation and to pay for his or her return journey home in the event of said applicant not receiving the situation, or being dismissed from it without legal cause. The contract, on the other hand, shall not contain any item to the effect

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that the expenses of the journey and keep are to be deducted from the wages, or to be paid off by the labour of the applicant after his or her entry upon the duties of the situation. The contract shall be signed by the head constable of the district and the certificate of removal shall be shown to him.

An accusation by reason of breach of contract may be made to the consul, who shall endeavour to obtain redress. Should he fail in his efforts to do so, he shall report the case to the Governor of the Län and, should circumstances warrant the payment of the return journey home by the keeper of the registry office, the consul is empowered to see that this be done. Compensation for such expenditure out of the security money can only be obtained if the administrative body in the Län, upon examination, authorize it.

Finally, the keeper of a registry office shall keep a list of all persons who through his agency have obtained situations beyond the borders of Sweden and Norway, and that list shall be accessible to the police.

Of late years **Communal Labour Bureaus** have been established in Helsingborg and Gothenburg, and preparations are being made for the establishment of such bureaus in Stockholm and other places.

Trade Unions. Strikes and Lockouts.

People's Palace in Stockholm.

The history of the **Swedish Trade Union** movement is closely connected with that of Social Democracy. Except Sick Funds and similar Provident Societies, up to 1882 there existed no other organizations of workmen than the so-called Working Men's Unions (Arbetareföreningar) in certain parts of the Kingdom, made up of all sorts of elements, with very general and indefinite programmes, mostly with a view to education, amusement, and social intercourse between different classes. Labourers were in the minority, but petty handicraftsmen, on the other hand, provided an important contingent. Several abortive strikes, however, since the middle of the seventies soon demonstrated the necessity of real Trade Unions. The first regular Trade Unions were formed in 1882, and the work of such Unions was in full swing in 1885. It was at this period, too, that Social Democracy began to get a footing in the Unions, especially those of Stockholm. More and more Unions sent socialistic representatives to the »Central Commission» of the Trade Unions, and joined the Social Democratic party; but other processes of combination also proceeded at the same time, i. e., those of the local Unions joining into »Workmen's Communes» (Arbetarkommuner; which, to the number of 19, were represented at the Trade Union Congress in 1898, and at the end of 1903 amounted to 94, comprising 785 Unions with a total of more than 50,000 members), and of Unions in the same trade joining into the National Trade Alliances.

The following are the chief features of the present organization of workmen. From a purely political point of view the Workmen's Commune is composed of the different Trade Unions in a place; these, by means of the »Commune», belong to the Social Democratic party; from a trade point of view the Unions in general constitute »Branches» of the respective National Trade Alliance; a great number

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of Alliances are comprised in the Land Organization. — The Branches pay the Alliance, partly entrance fees, and partly periodical fees for every member. The guidance of the Alliance work is discharged by the Board of the Alliance (in places where there are several branches, a Local Board can be started); its executive officer is a trustee (termed »Förtroendeman» or sometimes »Expeditionsförande»), to whom, in certain Alliances, must be added a cashier. The supreme authority in the affairs of the Alliance is the Congress, which meets from time to time. When a demand for altered conditions of labour, admitted by the Alliance Board, has not been granted by the employer, and the consequence is discontinuance of work, the associates enjoy an allowance out of the reserve funds of the Alliance or from the special fees which at these occasions are taken up from the members. There are also other provident funds, e. g., aids towards traveling expenses, burial funds, etc. — The Land Organization, established in 1898, has its executive organ in its Secretaryship, its lower decisive authority in its Body of Deputies, its higher in the Congress.

A statement of the number of the different Trade Unions and their members on December 31, 1903, is found in the subjoined Table.

To the Land Organization belong the following:

Alliances.	Unions.	Members.
Factory workmen	84	10,153
Wood workers	120	6,319
Conveyance labourers	36	3,316
Bricklayers and Masons	50	2,922
Stone cutters	88	2,635
Shoemakers	40	2,560
Tailors	58	2,330
Painters	42	2,250
Founders	59	1,926
Bakers	48	1,704
Tobacco workers	17	1,606
Saw-mill and Lumber-yard workers	35	1,550
Tin and Sheet-iron plate makers	30	1,180
Miners	9	1,138
Tile-stove workmen	32	1,100
Bookbinders	21	1,019
Chemical-technical workers	8	653
Glass workmen	17	552
Tramway-men	6	531
Leather-workers	19	476
Saddle-makers, Upholsterers	15	376
Coopers	22	300
Cork cutters	3	212
Glove-makers	7	182
Confectioners	5	75
Ropers	3	57
Total	874	47,122

The Trade Unions not comprised in the Land Organization are as follows:

Alliances.	Unions.	Members.
Iron and Metal workmen	123	16,773
Typographers	76	4,500
Railway-men	47	3,000
Brewers	21	2,004
Textile workers	14	760
Female workers	8	350
Female Glove-makers	4	300
Gilders and glaziers	6	200
Unions outside alliances	100	3,500
Total	399	31,387

Thus the grand totals are 1,273 Unions with 78,509 members, corresponding to about 1/4 of the total number of industrial workmen and miners of the country (in the year 1901, representing the latest available figures, amounting to 293,005). The contingent of these Unions attached to the Land Organization amounted to 69 % of the total, representing 60 % of the total number of members in the Trade Unions.

For the sake of comparison may here be given some corresponding figures of older dates. On June 30, 1898, 53,006 workers were registered in Trade Unions (not counting unions outside alliances), corresponding to about 1/5 of the total number of industrial workmen of Sweden. On December 31, 1900, these Trade Unions numbered 60,595 members. Comparing with the figure given above for December 31, 1903 — 75,009 — we point out an increase of 42 % since 1898.

However, there is also a movement in Sweden against the amalgamation of Trade Unions with the Social Democratic party. Among the expressions thereof

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we may notice the organizing, in 1899, of the Svenska Arbetareförbundet (Swedish Workmen's Association). The founders were workmen, principally of the Iron industry in the capital. The association has been developing, and several local branches have been formed in the capital as well as at different places in the provinces. In the beginning of 1904, these local branches numbered 66, scattered all over the country. The members numbered at the end of 1900, 2,210, at the end of 1903, 5,066; the latest figure accessible, March 1, 1904, indicates 5,144 members. The association, according to its constitution, has for its object to work for the elevation of the workmen's economical, social, and intellectual position, and holds with regard to political and religious questions an entirely neutral standing.

Strikes and lockouts. An investigation concerning strikes and lockouts during the years 1859/1900 has been made by Dr. *A. Raphael* on the account of a Royal Committee, appointed, in 1899, for giving proposals to a legislation concerning Arbitration between employers and workmen. According to this investigation, there does not seem to have occurred any strike or lockout during the years 1859/62. During 1863/1900 the numbers have been as follows:

Year.	Number.	Year.	Number.	Year.	Number.	Year.	Number.	Year.	Number.
1863	1	1871	5	1879	7	1887	16	1895	65
1864	—	1872	8	1880	3	1888	41	1896	102
1865	1	1873	11	1881	10	1889	38	1897	114
1866	—	1874	9	1882	4	1890	105	1898	163
1867	2	1875	3	1883	5	1891	63	1899	105
1868	3	1876	1	1884	6	1892	26	1900	133
1869	4	1877	3	1885	10	1893	53		
1870	1	1878	1	1886	29	1894	44	Total	1,105

Distinguishing strikes and lockouts, we find the following total numbers of *Strikes* for the particular quinquenniums:

Periods.	Strikes.	Periods.	Strikes.
1861/65	2	1886/90	224
1866/70	10	1891/95	242
1371/75	36	1896/00	559
1876/80	15		
1881/85	35	Total	1,123

Lockouts are to be found only for the three latest periods, and the numbers were respectively 5, 9, and 58; total: 72.

As will be seen from these figures, the strikes and lockouts show a sharp increase of later years. The preliminary statements for 1903 record 142, of which 109 are strikes, 16 lockouts, and 17 of undetermined character. The number of employers and workmen directly involved in these conflicts amounted to respectively 470 and 24,474.

Concerning the number of workmen participating in the greater strikes, and the number of work-days lost, O. DALKVIST has made the following Table for the years 1886/1902:

Year.	Strikes and lockouts.	Labourers involved.	Work-days lost.	Year.	Strikes and lockouts.	Labourers involved.	Work-days lost.
1886	12	1,185	15,700	1896	50	4,600	195,200
1887	4	300	4,300	1897	90	5,930	80,100
1888	12	2,200	5,350	1898	134	16,700	184,000
1889	22	2,379	36,190	1899	62	8,667	205,900
1890[1]	107	3,900	126,100	1900	104	10,290	331,600
1891	37	2,317	74,120	1901	127	6,200	210,000
1892	16	1,346	105,900	1902	123	9,600	350,000
1893	32	2,269	201,350				
1894	18	768	4,790	Total	996	81,580	2,146,710
1895	46	2,929	16,110				

[1] Inclusive of some smaller strikes among agricultural labourers.

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It is to be noticed in regard to the year 1902 that a »general strike» during three days (in the month of May), involving 120,000 workmen and thus representing 360,000 workdays lost, is not included in the above figures, this strike being of a mere political character (demonstration for the universal suffrage).

Employers' Associations.

The organization, in modern form, of the employers has taken place only in the latest years. In 1903, a special contest organization was formed, viz., the *Centrala Arbetsgifvareförbundet* (Employers' Central Association), which gained a rather great adherence, especially among the owners of mechanical works. The extent of the organization was displayed in the contest of 1903 within these works, when a lockout involving 14,283 workmen was proclaimed by 76 employers. This lockout led to the appointment of a Committee, consisting of employers and workmen, which has quite recently (in 1904) presented a proposal for a permanent, satisfactory arrangement of the relation between employers and workmen in the said industry. — The Centrala Arbetsgifvareförbundet has entered into connection with the organization recently formed among the Swedish Craftsmen, an account of which organization will be found in the preceding, on page 901.

Protection of Workers.

Stipulations on this question have been issued regarding minors, women, and — in certain cases — workers in general. The number of people engaged in industrial and mining work in 1901 — with women and minors counted separately — will be seen in Table 165.

Minors. As far back as at the time of the Guilds, a restriction in children's work was settled. The minimum age for being engaged as an apprentice was in the guild regulations of 1621 fixed at 14 years of age, »more or less»; in that of 1720, at 14. The court of industry regulations of 1739 and 1770, referring to the textile industry, to iron and steel manufacture, as well as to other manufactural trades, set down the age for being admitted as an apprentice, or so-called »learning child», at »10 or 12», with the duty enjoined on the employer of affording the children due instruction in reading and religion, at times when this most conveniently could be done. In the law of 1846 the age determined was 12, and the manufacturer was bound to certain duties considering the health, morality, and instruction of people engaged to work for him. In 1852 a penalty was ordained to be inflicted on whomsoever did not follow these directions, and, besides, night-work was forbidden for a workman under 18 years of age. **The ordinance of 1864 about liberty of trade,** setting down the same stipulations about age and night-work, also formulated certain other duties to be observed by a tradesman towards his assistants, which, however, in general remained rather ineffectual. In the ordinance of 1870, respecting precautions to be taken against necrosis among the workers when manufacturing matches or detonators, for the make of which common phosphorus is used — it was stipulated that for the preparation of the priming composition or the dipping of the matches in it, workers under 15 were not to be used. In the ordinance of 1896, which replaced that of 1870, the defense is extended to people under 18, and, besides, it is stipulated that no one below 14 years of age must be employed at the drying or packing up of matches.

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TABLE 165. *Number of Industrial Workmen in 1901.*

	Above 18 years.		Below 18 years.		Total of Workmen.	Among 1.000 workmen	
	Men.	Women.	Men.	Women.		Women.	Minors.
Factory industry.							
Flour and grist mills	4,044	35	206	6	**4,291**	10	49
Raw-sugar works	5,004	85	22	—	**5,111**	17	4
Sugar-refineries	2,164	468	52	5	**2,689**	176	21
Tobacco-manufactories	1,317	2,217	406	654	**4,594**	625	231
Breweries	4,994	1,356	246	25	**6,621**	209	41
Spinneries	2,761	3,818	1,406	1,716	**9,701**	570	322
Weaving factories	3,467	9,324	446	1,574	**14,811**	736	136
Clothing industries	1,240	6,151	260	1,625	**9,276**	838	206
Saw-mills	34,648	474	7,042	243	**42,407**	17	172
Joinery factories	7,942	92	1,348	53	**9,435**	15	148
Wood-pulp factories	6,474	216	672	38	**7,400**	34	96
Match manufactories	2,511	2,032	887	919	**6,379**	467	288
Paper-mills	4,176	1,016	466	420	**6,078**	236	146
Quarries and Stone works	10,774	2	870	—	**11,676**	—	75
Brick-yards	8,013	348	1,164	110	**9,635**	48	132
Glass factories	3,902	163	1,422	177	**5,664**	60	282
Charcoal works	7,075	103	141	2	**7,321**	14	20
Iron and steel factories	13,622	744	2,745	263	**17,374**	58	173
Shipyards	4,925	5	284	—	**5,214**	1	54
Mechanical works	17,967	27	1,801	2	**19,797**	1	91
Printing offices	3,439	539	1,161	145	**5,284**	129	247
Other factories	34,820	9,305	4,946	2,430	**51,501**	228	143
Total	**185,270**	**38,520**	**27,993**	**10,437**	**262,229**	**187**	**147**
Mining business.							
Mines	12,575	356	1,499	153	14,583	35	113
Metal works	14,790	1	1,402	—	16,193	—	87
Total	**27,365**	**357**	**2,901**	**153**	**30,776**	**17**	**99**
Grand total	**212,644**	**38,877**	**30,894**	**10,590**	**293,005**	**160**	**142**

The above mentioned lack of effectiveness as to the stipulations of 1864 called forth the **ordinance of 1881** about the employment of minors in manufactories, trades, and other works. Among its decrees — out of which those still are in force that refer to trade or other work which cannot be considered manufactural — we will quote the following ones. To work in a manufactory, trade, or other occupation no one must be engaged who has not reached 12 years of age, who has not acquired the minimum of knowledge prescribed for being allowed to leave the Common school, or who, in consequence of a delicate health or bodily infirmity, may be considered to suffer in the future from the work in question. *Children* (under 14) are not to be employed in factory work more than 6 hours at most, and *young people* (above 14 but under 18), 10 hours at most, at working-hours between 6 a. m. and 8 p. m., which are to be divided by recesses of 1/2 hour at least for a child and 2 hours at least for young people (out of which recesses 1 1/2 hour at least before 3 p. m.). A *minor* (under 18) must not, during the recesses, stay in any of the working-rooms belonging to the factory, nor yet be employed to clean a machine in motion. In a trade or other employment a minor must be used for work only between 6 a. m. and 8 p. m. and there are to be breaks of suitable recesses. A minor employed in work shall be taught in a Common school at times appointed by the School Board after hearing of the tradesman, or else get some corresponding instruction approved by

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the School Board; once a month a certificate on instruction approved is to be delivered to the tradesman.

In every manufactory the ordinance itself, with future additions or alterations, are to be set up at a convenient place, as also a specification of the hours when a minor has to begin and finish work, likewise the times fixed for the recesses.

For a transgression against the ordinance the tradesman as well as the proparent can be fined.

But the ordinance of 1881 — of whose sphere already in 1883 the mining work partly backed out and that of saw-mills and lumber-yards altogether — was not by far carried out to the extent intended either, and no more than 10 years later a committee had again to take the question in hand about protection for minors. Its report, returned in 1892, did not, however, take the shape of any new ordinance stipulations till 1900. The only thing effected in this department, during the interval, was the enacting of an ordinance of July 10, 1891, forbidding children at night-hours to carry on certain kinds of selling, further the **ordinance of Dec. 4, 1896,** replacing the former and interdicting children to carry on certain kinds of sale, and the **ordinance of Dec. 10, 1897,** containing a prohibition against the employment of children at a public show. Both these prohibitions are valid for boys below 14 and girls below 15. The ordinance of 1896 refers to the distribution or sale of goods in the streets and public places or localities. Such an interdiction, which on the initiative of certain local authorities can be set afoot, only comprehends the time from 8 p. m. till 8 a. m., with the exception of Sundays and holy days, when it can have force throughout the 24 hours. The ordinance of 1897 against children's being employed at a public show refers to rope-dancing, organ-grinding, or other similar entertainments where an admission fee is collected. The two ordinances stipulate a fine for the proparent; the child itself may, according to the ordinance of 1896, be admonished and chastised.

Leaving certain stipulations about women's work out of consideration for the present — of which more below — the **Law of 1900** regulates the work of minors in trades of industry. A minor above 12 may — unless he has a holiday — be employed in such work only on the condition of having got due permission to leave the Common school or else of proving that his school duty has come to an end. Before he is engaged, it must be proved by medical certificate that he cannot be supposed to suffer from the work in the future in consequence of bad health or bodily weakness. Who has not reached 13 must only work 6 hours at most, and other minors 10 hours at most out of the 24. Who has not reached 15 should enjoy requisite leisure for continued school instruction. During the recesses a minor must not stay in a workshop where the air is vitiated by matters dangerous to health but shall have access to another convenient room where he can take his meals. His work must not be carried on before 6 a. m. or after 7 p. m. A minor must not be put to manage a steam-boiler or a motor, to clean or grease a machine or motor at work, nor yet to lift off or put on the belt of a drawplate, etc., unless special, duly approved mechanical arrangements have been made. For underground work in a mine or a quarry a male minor under 14 must not be used and a female one not at all. In mining work and at blast furnaces and other industrial works necessitating so-called constant fire and at saw-mills and their adjoining lumber-yards, the work-hours for a male minor above 14 may, under certain conditions, extend to 12 hours at most out of the 24 as also to other hours than between 6 a. m. and 7 p. m.

With observance of other stipulations in the law, a minor having reached 11 may be employed in easy, open-air work at mines, saw-mills, and lumber-yards annexed to these.

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If the occupation of minors at a certain work is specially hard or dangerous to health, their employment can be prohibited, or else allowed only under certain conditions.

As to the law and the work-hours having to be set up in the locality of work, as to responsibility for transgression, right to prosecution, and proper court, the stipulations are the same as the corresponding ones in the law of 1881.

The law is, besides, applicable also when the trade is carried on by the State or a community.

Women. The only special protective stipulation for grown-up women is contained in the law of 1900, § 7, according to which a mother must not be employed with industrial work during the four first weeks after child-birth, in case it be not proved by medical certificate that she can begin the work earlier without any harm — and that a woman must not work under ground in a mine or a quarry.

Workers in general. As to the work-hours, the old stipulation about *Sunday and holy day work* is still the only protection enacted by law. It is nothing more than a prohibition against keeping a haberdasher's shop open on such days and a forbidding of every kind of work that can be put off and is not carried out for one's own or other people's need, as also a setting down of a fine for transgression.

Considering protection against *danger from work*, it has already been mentioned that the ordinance of 1864 about liberty of trade contains certain obligations for tradesmen duly to consider the health and capacity of their workmen. The ordinance, moreover, stipulates — and that not only to the interest of the workmen — that a factory where the fabrication necessitates chemical treatment and where a faulty procedure may occasion danger of fire or of life and health, only must be driven by a person who himself possesses a creditably certified skill to manage such an establishment, or else can prove to have engaged another person of testified insight in the trade for the purpose. Such stipulations, set down also to the interest of the public, are besides to be found in the ordinance of 1875 about inflammable oils, etc.; that of 1897 about explosives; of 1874 about the building, fitting out, and using of passenger steamers; of 1878 about the knowledge compulsory for captains on Swedish merchant vessels; and of 1885 about measures for the avoidance of collision between ships. And as a result of the care about public health, may also be considered the stipulation in the Board of Health ordinance of 1874, setting down that in localities — among these also factories and workshops — where a great number of people generally assemble, a sufficient ventilation must be kept up.

On the other hand, the stipulations concerning mining and the use of phosphorus are set down particularly for the protection of the respective workmen.

As to *mining* there are stipulations in the mining regulations of 1884 for the preventing of accidents, and if a mining work involves special danger to the workmen, the mineral-surveyor has to suspend it.

In 1870 an ordinance was issued about measures to be taken for the prevention of necrosis amongst the workers at manufactories where common *phosphorus* is used (matches, etc.); this ordinance was, however, replaced in 1896 by a new one with more rigorous and detailed stipulations. In it is decreed that the fabrication should take place in factories built for that purpose and not be driven or managed by anybody but a competent person. Special rooms, shut off from the other workshops, are to be assigned for the preparation of the lighting matter and the dipping of the matches in it, as also for the drying and packing of matches. In each of these rooms, which, moreover, must exclusively be used for

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those kinds of work, there is to be a constant change of air, brought about by means of a mechanical ventilator, and there must be arrangements to prevent the inhalation of phosphorus fumes or their spreading in the workshop. The rooms must be carefully swept and scoured. There must be special rooms in which to put up the wearing apparel and the provisions of the workmen and where they also can take their meals; likewise there must be a separate lavatory. Phosphorus should be kept in a particular, frostless room in a house where there is no dwelling-place. The fabrication must not begin before inspection by the trade inspector, and the workmen must not be engaged for the works above mentioned till having been medically examined. A workman who has undergone an operation must not take up his work again without a doctor's permission. In the work mentioned a workman must only be employed a month at a time; and then again after the lapse of a month in case no injurious effect of the work can be noticed. The proprietor of the works has to provide him with special working clothes, foot-gear, and soap. The workmen are to be severally booked and medically examined every three months at least. The Governor of the Län is entitled to prohibit continuation of the work in case great danger arises from neglect of the stipulations.

For **dangerous trades** in general — by which, in the main, are understood the same kinds of industrial business that fall under the law of 1900 about minors — the law of 1889, concerning protection against danger from trade (with a supplement of 1895 about trades driven by State or community), was the first to set up more energetic and definite stipulations on the duty of tradesmen to make all the arrangements necessary to protect the lives and healths of their workmen, and that with respect to working localities, machines, and implements as well as to the nature of the work.

Control. The duty of superintending the observance of the Board of Health stipulations above mentioned devolves on that Board or on the Community Commissioners, who must see to a factory's or trade's not being arranged or carried on in such a manner as to injure the healths of the workmen or the neighbouring people. If an inconvenience of that kind exists, the Board is bound to make the party concerned take proper measures to remedy it.

If this be not done within the time prescribed and if the inconvenience remarked is of a serious kind, the Board has to prohibit a continued driving of the factory or trade until further notice be given. To enforce the observance of the ordinance about minors of 1881 likewise belongs to the Board of Health or the Community Commissioners. According to the mining regulations of 1884, mining is to be controlled by the Mining Board in such a way as to secure the safety necessary for the body of workmen.

The special inspectors, however, spoken about in the ordinance of 1881 only by the law of 1889 became a fact. On the strength of this law, a suitable number of competent men, called **trade inspectors,** shall be appointed by the King to supply tradesmen with informations and advice concerning the protection of workmen against danger from work. Besides, they have to see to the observance of the law on protection and to examine the instructions that are to be followed by the workmen for the avoidance of accidents and bad health resulting from the work. In the sphere of their functions they must constantly pay attention to the aim of the law being attained without involving unreasonable expenses nor yet great inconvenience to the tradesman. More detailed stipulations are given in the instruction of 1890. The inspector shall visit those workshops within his district that have to be inspected, above all such as can be supposed to need special protective arrangements. For that purpose he is entitled to admission into the workshop during work-hours, after having given notice to the employer, and he has, moreover, a right to undertake necessary examinations in the loca-

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lity. In case an arrangement demanded by him be not effected, he can report that circumstance to the county government. The respective municipal authorities and medical men should afford him the assistance required. According to the proclamation of 1896, accidents of great consequence should be reported to the magistracy of the county government, and by them to the inspector.

The number of inspectors, who, to begin with, were 3 and in 1895 increased to 5, now since 1900 amounts to 8 in an equal number of districts, besides which a special inspector since 1895 is appointed to superintend the fabrication of explosives. The inspectors subordinate to the Board of Trade, which can summon them to consultation. An inspector has to give an annual report to this department about the application of the protective law. The number of factories subject to inspection was, in 1891, considered to amount to about 9,000, in 1899 to 14,430, and in 1902 to 18,000. From July 1, 1890, to the end of 1902 inclusive, 9,845 workshops with 266,690 workmen had been inspected. The number of factories inspected together with the workmen belonging to them, and notices given to employers concerning measures for protection to be taken, were for the years below as follows:

	Factories.	Workmen.	Notices.
In 1891	503	31,688	1,957
» 1894	918	37,314	2,920
» 1899	1,420	55,428	3,422
» 1902	2,135	66,137	5,728

By the law of 1900 the sphere of the inspectors was enlarged by the observance of this law also being placed under their control; to its effectiveness a number of new stipulations are, besides, meant to contribute. Accordingly, minor workmen are bound to be medically examined once a year and, beyond that, as often as deemed necessary by the Governor of the Län, after notice from the trade inspector or out of other reasons. In the list which the employer is bound to keep of these workmen, the doctor has to note down whether or not a minor is allowed to continue his work. The annual register shall be sent in to the trade inspector (or for mining work, to the mineral-surveyor). A tradesman employing a minor shall announce this to the Governor and to the municipal authorities within a month after engagement, and likewise he is to give notice when the employment ceases. This information is sent in by the Governor to the inspector.

Accident, Incapacity, and Old Age Insurance. Compensation for Injury arising from Accident while at Work.

It was owing to a motion proposed in the Riksdag of 1884 by Mr. Adolf Hedin, that Swedish Legislature first sought to solve the problem of Workmen's Insurance. In that year the **Workmen's Insurance Committee** was appointed, and on the basis of their conclusions was framed the government bill dealing with insurance against accident for workmen while at work, which was brought in during the session of the Riksdag in 1890.

The principle underlying the bill was that it ought to be compulsory for the manual labourers employed at certain industrial works to be insured against ac-

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cident while in the pursuit of their work, at the charges of their employers and in a *national insurance office established by the State*, in which also it should be possible for voluntary insurance against accident under the same conditions to be effected; such employers, however, as should be shown to have already made satisfactory provision for compensating their workmen in case of accident, should be liberated from the obligation of insuring in the office so instituted. The compensation rates were determined irrespective of the amount of wages the injured workman was in receipt of. The bill was thrown out by the Riksdag, however, and the same fate befell a new bill on the same lines brought in during the following year.

Meantime the proposals of the Workmen's Insurance Committee with regard to *Old Age Pensions* had been handed in, but as the Government considered that the question had not as yet been sufficiently investigated, and that, moreover, it might be more feasible to deal with both Old Age Pensions and Accident Insurance in conjunction with, and as corollaries of, the question of insurance against Incapacitation of whatever sort, it appointed in November 1891 a new committee, **»The New Insurance of Workmen Committee»,** to reconsider the question in all its bearings. In March 1893 the committee handed in its report, consisting for the most part of a proposal, drawn up by Professor A. Lindstedt, with a view to an Insurance Bill that should enact the allotment of pensions in cases of *permanent disability* for labour, and the bill introduced into the Riksdag by the Government in 1895 was in all essentials based upon that proposal.

By the terms of that bill employer's assistants, engaged in trade, industry or handicraft, foremen of works, manual labourers, and any persons engaged in employments which placed them in the same category as workmen, were all to be compulsorily insured in a *central public office* against any **permanent incapacity for work,** from whatever cause that might arise, whether it were advancing years, accident while at work, or anything else. Exception to the universality of application of this insurance was to be made for: those under 18 years of age, those whose annual income from labour exceeded 1,800 kronor (£ 100), and those who had not had employment for all the days of at least *one* calendar week in the year with one and the same employer. The insurance was, on the other hand, to include the workmen's *wives and children.* Those on whom the obligation rested to be insured were to be divided into *three classes:* men in receipt of more than 10 kronor (11 shillings) a week; men with less than that amount; and women. The *pension fee* to be paid by these three classes was fixed at 25, 15, and 10 öre a week respectively ($3^1/_3$, 2, and $1^1/_3$ *d.*), while the employers were required to give 15, 10, and 5 öre (2, $1^1/_3$, and $^2/_3$ *d.*) respectively; any employer, however, who should in any year be taxed, either for real estate at a maximum of 3,000 kronor (£ 165), or for income derivable from capital and labour at a maximum of 800 kronor (£ 44), was to be entitled to have the sums returned which he had paid down during that year as pension fees for his workmen.

The State was to take upon itself the cost of *administration*, calculated to amount to about 2 % of the total amount received in the shape of premiums; further, the amount required to render the generation then between the ages of 18 and 40 participant in the insurance for themselves and for their wives and children; and, finally, a guarantee for pensions already granted and, to a given amount, a guarantee also for pensions to be granted in the future.

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As a foundation sum towards a *pension*, 50 kronor, it was appointed, should be paid, together with an additional 10, 5, or 2 öre, according to the class to which the pensionary belonged for every week he or she had been insured. Thus the amounts of pension receivable upon the expiration of the minimum of time stipulated (viz. 260 weeks) as requisite to secure a pension, would be respectively: 76, 63 and 55 kronor; if anyone had been insured from his or her 18th to his or her 70th year, the amounts of pension would be 320, 185 and 104 kronor respectively (£ 17·6, 10·2, and 5·7). Every fatherless child born in wedlock and under fifteen years of age was to receive 30 kronor a year (1 £ 13 *sh.*). That was the scheme as far as obligatory insurance was concerned. In addition to that, however, there was to be a *voluntary* insurance and, furthermore, any person insured who, by change of circumstances was no longer entitled to benefit by the insurance, was to be able, by the payment of proportional fees, to obtain the right to a pension, greater than that to which his payments up to the date of alteration entailed.

Finally, the insurance was to be managed by a *Pensions Board* in conjunction with *Local Pensions Committees*. The chairmen of the local committees were to be appointed by the Governor of the Län; the members of the committees were to be elected by the communal assembly or by the town council; half of the total number were to be chosen among the employers, half among the workmen. Beyond superintending the administration of the law, the committee was to act as a court of arbitration in cases of dispute arising out of insurance questions.

These proposals were also thrown out, the Riksdag once more demanding a further investigation. On the basis of that investigation a new bill was brought in by the Government in 1898, concerning *Insurance against Invalidity*.

The chief points where this bill varied from that of 1895 were: that the obligation of the employers to contribute to the insurance was removed; a contribution from public money covering the amount thereby lost; that a grant of public money of the same amount was to be allotted to the voluntary insurance scheme; that the pensioning of children was to be excluded; and finally, that a pension should not under any circumstances be paid to anyone not yet 50 years old, even if invalidity should have come on earlier. In such cases of invalidity, provided it has been due to accident in certain trades, it was the opinion of the Government that support should be given by the employer.

The bill was accepted in principle by the Second Chamber but rejected by the First, on the ground, so far as could be gathered from the debate, of disapproval of the principle of obligatory insurance, and of apprehension lest the State should be taking upon itself too heavy a burden.

Relinquishing for the time being the attempt to solve the problem of Old Age and Invalidity Insurance, the Government brought in a bill in the session of 1900, regarding *Compensation for Injury as a result of Accident while at work*.

The principle underlying this bill, that an employer was liable to give support, more or less in amount, to any persons injured in his service, or if they have been killed, to their relatives, was, it may be noted, not an entirely new one in the history of Swedish legislation. The Hiring Act of 1833 stipulates that a master shall himself pay damages, if any person, acting in his stead, have maltreated any *servant* of his, he being entitled to sue the guilty party for the amount thereof. The royal ordinances of April 7, 1830, and Jan. 23, 1842,

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prescribe that private individuals or companies, who employ a body of troops to do work for them, shall be constrained, in case any *soldier or sailor* shall be wounded or injured while in their employ, to make him a yearly allowance proportionate to the injury received and the suffering thereby occasioned. If death ensue immediately, or within a year and a day of the accident, the widow shall receive an annual allowance as long as she remains a widow, and also every one of his surviving children still a minor, until the youngest shall have reached the age of 15. Finally, the law of 1886 concerning responsibility for injury arising from *railway traffic* enacts that if anyone engaged in the service of the railway, or working upon it, be killed or injured while carrying on such work or employment, the proprietor of the railway is liable to pay damages, provided the man who suffered the injury have not brought it down upon himself by infringement or neglect of the regulations in force, or by some other gross carelessness. That holds good also if the injury has been caused by the working of another railway, provided the proprietor of that railway be not himself, by reason of the above-mentioned stipulations, liable to make recompense for the injury received. As regards the assessment of the damages to be paid, the law refers to the Penal Code, but enacts, furthermore, that if the person who has suffered bodily injury, be entitled by virtue thereof to receive a pension or other allowance from a fund, which has been entirely or very materially formed by contributions from the proprietor of the railway, or if the injured party have been insured against accident by the proprietor of the railway, then the said proprietor of the railway shall be exempted, to the extent to which the injury is thereby compensated, from his obligation to make restitution.

The bill brought in, as above mentioned, in the session of 1900, was not passed, but as it had been favourably dealt with by the Special Committee, and had even met with the approval of the Second Chamber with certain provisoes, among others that a national institution should be founded for voluntary insurance, the Government thought well to bring in the bill in a somewhat revised form in the following session (1901), and it was then accepted and passed by the Riksdag. The chief provisions of **the law of 1901** are as follows:

If a workman or foreman be injured in consequence of an accident while at work in certain branches of industrial activity, his employer is liable to pay him compensation. The injury, however, may not be such as the injured man has purposely or by gross carelessness occasioned, nor such as has been purposely caused by any third person, he not being a superintendent or other officer in authority in the works; nor may the injury have been brought about by any cause not connected with the nature of the work in hand or with the circumstances under which it is pursued. The injury must be the result of accident, arising out of the prosecution of the trade or industry of the employer. The State or any community, if they carry on any work of a similar nature in the manner of a trade or industry, shall be liable in the same way to pay compensation.

The compensation to be paid is fixed at the following figures: *a*) If the accident have caused serious diminution in the injured person's capacity for work for more than 60 days after the accident: 1 krona (1·10 shillings) for sick relief per day, from and after the 61st day, until the injured person be restored to health or the accident be proved to have occasioned permanent loss of, or diminution in, the said injured person's capacity for work in the future; *b*) if the accident have occasioned permanent loss of, or diminution in, the capacity for work: an annuity, in the former case, of 300 kronor (£ 16·5), in the latter, of such an amount as is com-

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mensurate with the diminution in capacity for work, to run from and after the 61st day after the accident, or from the subsequent date at which the accident shall be proved to have occasioned permanent loss of, or diminution in, the capacity for work; it is stipulated that no annuity is to be paid, unless the capacity for work be diminished to the extent of at least one tenth; *c*) if the accident results in death within the lapse of a year: firstly, 60 kronor (£ 3·3) for funeral expenses, and, secondly, an annuity to the widow as long as she remains in that state of 120 kronor (£ 6·6), and to every one of the children under age an annuity of 60 kronor, until it reaches the age of 15. If the annuities to be paid should together exceed 300 kronor (£ 16·5), they are to be proportionately reduced so as not to be more than that figure.

The law states in further detail, when loss of capacity for work may be considered to exist, and also the different percentages of diminution in the capacity for work which different forms of injury are considered to represent.

The widow or children of a foreigner are not entitled to an annuity, unless at the time of the accident they were resident in the country; during such time as a person who is entitled to an annuity is resident out of the country, he is not permitted to draw such annuity. The Government may, however, provided mutual terms are agreed upon, make exceptions to the two above-mentioned provisoes, if it see fit. If an annuitant is condemned to prison or to hard labour, he may not draw his annuity while he is undergoing his punishment.

Supposing that, when a workman has been injured by accident, he receives in consequence thereof support from some fund, which has been wholly or in part provided by contributions from his employer, or if the workman have been insured at the charge of his employer in other ways than through the agency of the National Insurance Office hereinafter mentioned, the amount of the relief to be paid out from such fund or other insurance agency, shall be deducted from the allowance to which, under other circumstances, the injured party would be entitled. A similar deduction is to be made from the amount of compensation for injury from accident already paid out in pursuance of other laws.

The right to compensation just referred to, does not preclude claims to damages otherwise payable in consequence of accident; an employer, however, may deduct the amount of compensation payable by the law now under discussion from the amount of said damages. If anyone other than the employer is liable to pay the damages, the employer is entitled to take the damages, if the corresponding amount of compensation, due in accordance with the terms of the present law, has already been paid.

An employer can insure his workpeople against accident in a *National Insurance Office* (Riksförsäkringsanstalten), so that, as long as that insurance holds good, he is exempt from paying the compensation prescribed by this law. The Office is entitled to make deductions, according to the above stated principles, for damages already paid, and also, after notice has been given to the person who has to pay the damages, to take from him the amount of the damages, in the place of the person to whom the damages accrue, provided that amount is paid out from the Office.

By the purchase of an annuity in the Office an employer can liberate himself from the obligation of paying such an annuity, and he then possesses the same right as the office to take the amount of damages from any other party who is liable to pay them.

Notice of any accident, by which a workman has been injured, must be made without delay to his employer or the foreman of his department; a doctor should be called in to attend the injured man. Omission to comply with either of these directions may involve a diminution in the amount of compensation awarded.

If the injured man has not been insured in the National Insurance Office by his employer, the parties to the case, the court or the adjudicators, shall not

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thereby be precluded from free of charge taking the opinion of the Office, as to whether the kind of work being done when the accident occurred, comes under the purview of the act, or as to the extent to which the injury received may be considered to have caused diminution in the capacity to work of the person so injured.

If the estate of the employer be surrendered for the benefit of his creditors in bankruptcy, a dividend shall be paid on an annuity claim, consisting of the united amounts of the capital value of the interest on the day on which payment is due, and of the annuity running to the same date. With the sum of money payable as the capital value of the annuity, an annuity in the National Insurance Office shall be purchased for the injured workman, provided the annual sum to be obtained through the Office be not less than 45 kronor (£ 2·5).

Should an employer neglect to pay an annuity as it falls due, or if a private employer of labour gives up his business, or goes abroad to live, or if his business passes into other hand, or if a petition in bankruptcy be filed against him, the annuitant is empowered to sue before the competent authority for a security or pledge to be lodged for the payment of his annuity. If such security be not lodged within the prescribed time, the capital value of the annuity shall be paid down and, in cases where an injured workman is concerned, an annuity shall be purchased in the National Insurance Office for the capital amount of the previous annuity.

The right to compensation cannot be transferred to another person, nor can it be distrained upon for debt.

If an employer desires to make an agreement on the basis of a special arrangement with his workmen, in respect to the compensation to be accorded in case of accidents in the future, he is entitled to submit such arrangement to the National Insurance Office, to hear the opinion held of it. The arrangement in question may not receive the sanctioning approval of the Office, unless it appear that the terms of the same are favourable to the workmen. An agreement, drawn up in writing and signed on the basis of and in accordance with an arrangement approved by the Office, shall be binding at law. The approval accorded by the Office can be at any time rescinded, but that act will not affect the binding nature of an agreement made before the employer has become aware of the action of the Office in canceling its approval. An agreement entered into in another wise will not be legally binding, unless it have been made in writing subsequent to the accident (or the death of the injured person). An agreement to the effect that a workman shall receive a lump sum in place of an annuity, is not valid, unless the amount of the annuity be less than 45 kronor a year.

An employer, engaged in other branches of trade or industry than those covered by the terms of the Act, is entitled to afford his workmen the benefits of compensation for injury in cases of accident by means of insurance in the Office; in the same way, any workman is at liberty to employ the same means for providing himself with the same claim to compensation in case of injury.

The insurance premiums are to be fixed in relation to the comparative danger of the work engaged in, in general, and to the special circumstances surrounding its prosecution, in accordance with the principles of the technics of insurance which dictate the measures necessary for covering the probabilities of risk to which the Office lays itself open by its insurance. The charges for the organization and administration of the National Insurance Office are to be defrayed out of the public treasury.

The *National Insurance Office* (Riksförsäkringsanstalten), established through this law, commenced its activity on January 1, 1903.

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2. SOCIAL CONDITIONS AND SOCIAL STATISTICS.

The social conditions of Sweden in general have already been briefly related in a preceding chapter (page 141), besides which diverse informations on the subject have been given in different places where the context has occasioned it. What remains here to be treated of are the so-called social statistics, nowadays becoming more and more prominent, or the statistic, treatment of questions concerning the labouring population and the conditions under which their labour takes place. To these are attached some informations concerning the work of later times for the reformation of social relations, as well as other social functions, which could not very well be ranged under preceding chapters.

The sources for **Social statistics** or for the knowledge of the social, economical, hygienic, and moral conditions of the labouring population, are in Sweden, partly the general statistics, partly investigations on the subject by royal committees or other public institutions, investigations by communal authorities and by private associations, and finally the official so-called statistics of labour.

A) **The General statistics** contain in our country remarkably many informations on the subject in question. Especially is this the case with our population statistics as well as manufacturing statistics; but also the quinquennial reports of the Governors, the savings-bank statistics, the judicial statistics and other branches give data, which belong to the social statistics. A number of facts from earlier statistics, belonging to this subject, are still awaiting a suitable elaboration.

Of the approximate number of *married* people in different trades we are informed by the censuses. Also concerning the number of *children* in different trades and classes of Society the censuses give now information. Since 1901, the distribution according to *professions* of men entering in marriage, of fathers of legitimate children, and of men deceased is object for comprehensive treatment in the vital statistics. In 1890, a special investigation occured with respect to the *birth*-places for different ages and civil conditions among the population of Stockholm.

B) Of **Committee memorials** of interest in this respect we specially observe the elaborations executed by the first Workmen's Insurance Committee (1884/89; see p. 1072) as also the so-called Labourers' protection committee of 1891. The most important matters which these and other royal committees have dealt with are the following.

a) **Wages.** The statements communicated about this are unfortunately now rather antiquated, and on the whole this chapter of the social statistics is in Sweden the least explicated of all. Concerning the conditions of wages of the *agricultural labourers* some data are previously given (page 614). For the *industrial labourers* there are presented some figures from the years 1879, 1884, and 1891, which show a considerable increase during the intermediate periods. This increase

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has certainly been still larger during the last few years, but concerning the same informations are only to be had from some few of the trades.

b) **The length of the working day** was ascertained through extensive investigations by the two committees above mentioned. From 1884 to 1891 a decrease of the average working-time of industry a day was found to be from 11·1 to 10·7 hours, a decrease which doubtless has afterwards still continued. Even within the domain of agriculture the length of the working-day has been perceptibly reduced.

Night-work occurred in the year 1884 in 42 % of the whole number of investigated factories and works, and lasted on an average from 7 to 8 hours for every hand. The arrangement of night-work is principally of three different kinds, viz.: *a*) work every week-day night; *b*) work every week-day night during a week, but day-work during the following week; and *c*) work every second night and every second day. Each one of these three arrangements occurs about equally often. It has to be remembered that *Sunday rest* is perfectly realized in the Swedish industry, where such a thing is not made impossible by special circumstances. As to the communication system, there is generally regular sunday rest, still far from every sunday for the same working-man. — In the iron-works, work is usually kept up all day and night, with exchange of hands every eight hours and three such spells for each hand during two days.

c) **The sick-relief and pension funds** were accounted for in detail by the Committee of 1884, besides which annual reports nowadays are given of *registered* funds. We devote a special article to this question below.

d) Concerning **paupers fully provided for** an extraordinary detailed investigation was arranged in 1884, of which a proof is given under the heading of Poor Relief in the above. Among results gained we may here mention that the *death-rates* among these paupers in ages over 65 years proved to correspond rather closely with the mortality in these ages of the whole of the population.

e) **The distribution according to age and civil conditions** in different trades was also examined in 1884 and gave several interesting results, which however we have not occasion to relate here.

f) The frequency of **accidents during work** was studied by the Committee of 1884, and was later on made the subject of a special investigation in 1897. In the meantime, between these two investigations at least the number of accidents with fatal issues appear to have not slightly diminished, or from 0·64 to 0·38 for thousand workmen in the industry proper. These figures, however, are not quite reliable. Accidents, involving lasting inability to work proved to be in 1897 about 1·82 for every thousand workmen, and of such entailing passing injury 27·44. The last figure evidently is too low and consequently also the sum total of all the accidents, which according to the above should be 29·64 per annum for every thousand workmen.

g) **The mortality in different trades.** The explications, produced by the Committee of 1884, are in point of a fully scientific method the best executed in any country. Unfortunately the value of the results is diminished through the partly less satisfactory quality of the material. As chief result appeared, that the mortality among factory-men was a little higher than among the whole population. As to special trades, it was calculated (for the years 1879/82) that the *expectation of life* was, in years, at the age of 30:

Iron-factorymen	38·4	Shoemakers	34·8	Watchmakers	31·4
Timbercutters, sawyers	38·2	Blacksmiths	34·5	Butchers	30·8
Joiners	35·8	Tailors	34·4	Coppersmiths	30·5
Spinners and weavers	35·5	Bricklayers and pavers	33·3	Typographers	29·0
Millers	35·3	Painters	32·2	Goldsmiths	27·6
Tanners	35·2	Mechanics	32·1	Tobacco-workmen	25·4
Miners	34·8	Bakers	31·8	Bookbinders	24·0

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A closer investigation showed, however, that these considerable differences only in a less degree could be attributed to the direct influence of the trade. The death-rate principally depends on whether the trade is preferably carried on in the country or in the towns, and whether it gives more or less opportunity to early and numerous marriages. A feature of importance is naturally also that to some trades particularly people of strong constitution devote themselves, to others mostly persons of weak health.

The investigations in question included also the *cause of death* for our factory-men as well as for certain other trades. As to the towns, the result might be considered fully reliable, and it shows that for male workmen death in 43·2 % was caused by affections of the respiratory organs, while violent causes of death took away 11·3 %, disorders of the digestive organs 9·1 %, diseases of the brain and nerves 7·8 %, infectious diseases 7·6 %, constitutional diseases 7·5 %, diseases of the circulatory organs 5·8 %, of the urinary and sexual organs 5·6 %, other diseases 2·1 %. For the special trades there are great differences, but the absolute figures are often so small, that the result is uncertain. Besides, the elaboration of the material is in this case less satisfactory than otherwise, which prevents the drawing of further conclusions.

C) **Communal investigations.** In this respect we may mention the social researches in *Gothenburg*, in the sixties, that lead to the celebrated »Gothenburg system», and the comprehensive investigations into the dwelling conditions in *Stockholm*, at the general enumerations in 1894 and 1900, and still more detailed at the special enquêtes of 1896 and 1902, concerning which see p. 1084.

D) **Private investigations.** The principal ones are those published by the *Lorén foundation*, established according to a will of V. Lorén (1858/85) and before mentioned in this work. Most of these works treat the social conditions of Sweden, partly on grounds not before investigated, and are mostly of rather high value.

Of series of works in question we may mention the before quoted investigations by U. von Feilitzen, concerning the economical position of our agricultural labourers, and the many-sided investigations of J. Leffler with respect to the woman's work in Stockholm; further investigations concerning the conditions of life of the harbour-workmen in Stockholm by K. Tengdahl; The consumption of provisions of Swedish workmen by E. O. Hultgren and E. Landergren; The studies of the history of the system of wages in England by G. Steffens, etc.

Here is also to be mentioned the rich statistic material gathered in our days by the *Trade-Unions*, which in the future may probably be very much enlarged; then this material may also be object of a more uniform and concentrated elaboration than hitherto, as a rule, has been the case.

E) **The official Labour statistics.** At the Riksdag of 1893 a motion was made by Mr. Ernst Beckman concerning the effectuation of an official Swedish labour statistics, on account of which the Riksdag decided an investigation to be made concerning the most suitable way of arranging one. The Government proposed in 1895 to establish for the purpose a special bureau of statistics, but the Riksdag then only granted a supply for experiments, the execution being commissioned to

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the Board of Trade. Such supplies have afterwards been granted every year, and on that account statistic investigations in modern form have been published concerning bakeries, tobacco-manufactories, and the mechanical works, besides which an investigation pertaining to the printing-offices is being worked out.

A more stable position is won by the decision of the Riksdag of 1902, according to which, since 1903, the Labour statistics is left to a special *Bureau* in the Board of Trade, yet not fully organized. From this bureau a periodical (Meddelanden) is issued quarterly, containing among other subjects reports on strikes and lock-outs, prices, rent of workmen's dwellings, etc.

The Co-operative Movement.

The mercantile undertakings started in Sweden on the basis of co-operation are of very various description. In the field of agriculture there may be specially mentioned the joint-stock dairies and the farmers' associations. In towns and industrial communities, there exist building and dwelling societies and associations of bakers, while latterly combinations of producers have been formed in a number of industries, such as: the stone, shoe, and cigar trades; it is as yet too early to determine what future awaits them. By far the most important co-operative enterprises at present existing in Sweden are unquestionably those which are concerned with the distribution to their customers of the necessaries of life.

Co-operative Trading Associations. Most of these associations are to be found in the thickly populated country districts, for instance in the vicinity of a mill or some iron works in Central Sweden, or of the sawmills in Northern Sweden, or again, in the neighbourhood of townships that have sprung up around the railway stations in the South of the country. It is only quite recently that similar associations have begun to make their appearance in towns; hitherto they have not attained any amount of success in urban communities. As, however, it is the organized working men in the towns who have embraced the co-operative principle, it may be safely taken for granted that in a future not far distant the forces promoting the co-operative and trade union movements respectively, will join hands and cordially support one another. That this consummation has not yet, in general, been realized, is due to the mistrust cherished by the leader of the Labour Party abroad towards co-operation; that feeling of mistrust has now given place to one of sympathy with the movement, which will inevitably lead to a more wide-spread interest in co-operation among working men. In the country districts the co-operative societies have, as a rule, no connection with the workmen's organizations; that would, indeed, in many cases lead to difficulties, inasmuch as the employers lend their support to the co-operative society.

In the extensive sawmill districts surrounding the towns of Gefle and Sundsvall, there are a great number of co-operative trading societies. In these and other industrial centers in Norrland the co-operative movement would seem to have the best chances of development and progress. The total number of the co-operative trading undertakings in Sweden at present is about 400. About half of the number are Trading Companies, and therefore subject to the provisions of the Company Act of 1895. Thus, the share-capital must amount to at least 5,000 kronor (£ 275), the shares must have a minimum value of 10 kronor (11 shillings), and, in case the share-capital exceeds 10,000 kronor, each share shall be at least 50 kronor.

Several of the associations of older standing, dating back in many cases to the period 1861/80, are business undertakings pure and simple, devoid of all

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ideal objects. The whole of their profits of trading are usually distributed among a small number of shareholders in the form of dividends on capital invested. Often the very existence of the so-called co-operative association is dependent upon the manager of the works or the sawmill; he has a seat allotted to him in the Board of management, while the working men are only represented for the sake of formality. These associations are often indebted to the employers for considerable advantages, such as: premises free of rent, transit of goods free of carriage, assistance with clerical work and book-keeping free of charge, and advances of money, etc. Hence, these associations are, as a rule, financially very sound, for though the credit system prevails, all concomitant risk is eliminated by the practice of deducting the value of goods received from the sum due in wages at the works.

However gratifying the results of these trading undertakings may be from a financial point of view, it is evident that their not being co-operative in character or constitution renders them void of importance. Only a few individuals, strictly limited to those with a given number of shares, are in a position to derive any pecuniary benefit; moreover, the alleged moral benefit accruing to the workmen in the shape of the example and precept afforded by the associations in the art of looking after their own interests, is as a rule wholly imaginary, inasmuch as all initiative and responsibility in connection with the concern rest, not upon the workmen themselves, but upon some foreman or superior.

Even though there are not wanting employers who foster and encourage the co-operative movement, yet there are others who actively oppose it. This antagonism may take many forms, thus, an employer may refuse to grant the use of any part of his property for the purposes of a co-operative business, he may start a shop of his own to be run in competition with that established by his workmen on co-operative lines, or again, he may adopt the monopoly system for providing his workmen with the necessaries of life, in other words, the obnoxious truck system. As employers often possess all the land in the vicinity of their works and their domicile, it not infrequently occurs that it proves a practical impossibility for the workmen to embark upon a retail co-operative business for their own advantage and benefit.

There are, however, some of the trading companies founded in recent years which are not money-making concerns pure and simple, but have an entirely democratic stamp. The very constitution of a company on the other hand, is such, that the money-making element will come to the front, and it proves exceedingly difficult to prevent the drawbacks resulting therefrom not to make themselves felt.

The constitution of the Co-operative Store Societies is in accordance with the Association Act of 1895. Speaking broadly, associations differ from companies in having a fluctuating amount of capital and a varying number of members. It is not the case in associations as it is in companies that a limit must be fixed both regarding capital and number of participants; with regard to associations, no limit is prescribed whatever, either at the time of establishment or subsequently. In an association the personal element is a factor of more moment than in a company; by the Association Act it is stipulated that no nember shall exercise more than one vote. The amount of a member's share or portion in the concern varies between 5 and 25 kronor (5 1/2 *sh.* and 1 £ 7 1/2 *sh.*), being in the majority of cases 10 kronor, or about 11 shillings. The members of an association are only liable for the amount of their paid-up shares (associations without personal liability) or else for a certain limited amount for instance 25 or 50 kronor (associations with unlimited personal liability). New members can be admitted at any time and are at liberty to retire from membership at will, though it is possible for any association to stipulate that a retirement shall not take place until at least two years after entry. The association is represented by a Board of management, with 5 or 7 members; the actual business is conducted by a manager and assistants.

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Members' meetings are held periodically from one to four times a year. According to the wording of the Association Act of 1895, it is not permissible to trade with non-members of the association. But after some vain endeavours to get altered legislative provisions in this respect, it has recently been decided, by a judgement of the Supreme Court, that such a registered association, having duly accomplished its register duties, has the right of selling also to non-members, in case, however, the business be *chiefly* carried on with members.

Both trading companies and co-operative associations must be registered at the offices of the provincial government, in order to establish their legal status and to entail the rights and responsibilities of an incorporated body.

There are no statistics of an official character bearing upon co-operative societies. The only available figures on the subject are the returns of the members of the Co-operative Union; they are to be found in an article in the »Social Tidskrift» of 1901. From those returns it appears that 44 of the organizations belonging to the Union have a membership of 11,000 in all, being an average of 250 per organization; their turn-over was 3 million kronor, being 71,000 kronor per organization and 284 kronor per individual member; their working capital was 317,000 kronor, being 7,204 per organization and 28·8 per individual member. (A krona = 1·10 shilling).

The Swedish Co-operative Store business are, as a rule, adherents of the Rochdale system. In many places, however, ready money payment is not always enforced. The members, who usually have equal voting rights, irrespective of the number of their shares or lots, consist almost exclusively of workmen. The age at which eligibility for membership commences is generally 16. The articles of association and the various by-laws differ very much, owing to there having been no model for all to follow, and also to the want of uniformity of action previous to the constitution of the Co-operative Union.

The working capital generally consists only of paid-up shares of the members. These shares being low in amount and it being often stipulated that a member shall not possess more than one share, the working capital proves in many cases insufficient to admit of ready money being paid for the wholesale purchases. It is customary to allot some portion of the profits of trading to a reserve fund; the members receive interest on their capital at the rate of 5 %; in some of the older companies as much as 10 % is given. The remainder of the profit is distributed among the members in proportion to the amount of their purchases during the preceding year.

For the purpose of uniting together the numerous co-operative trading societies up and down the country, the Swedish Co-operative Union was constituted in the autumn of 1899; on April 1, 1903, 73 trading companies and associations had joined the Union. An annual tax of 10 öre (about 1 1/3 *d.*) is paid by these companies and associations for each of their own members. The Union affords advice and information to the constituent bodies and provides them with book-keeping materials, etc., issues and disseminates Co-operative literature, arranges for lectures to be delivered, organizes a Co-operative Congress every year, etc.

The organ of the Union is at present the »Social Tidskrift», at the same time organ for a number of other social movements.

Co-operative Creameries. The best known of all co-operative enterprises in Sweden are perhaps the co-operative creameries, butter and cheese factories. They have become very useful to the farmers and have saved them much money, which would otherwise have been lost. Some figures will show the development of this kind of agricultural co-operation. In 1890 the co-operative creameries of Sweden numbered only 73. At the end of 1895 the number was no less than 302, and in 1900, 430. The whole number of creameries this last year was 1,688. In our southernmost province, Skåne, where agriculture has reached

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the highest development, the increase in the number of co-operative creameries is extraordinarily large, as will be seen from the fact that, in 1890 the number was 10, but in 1900 again 106. On the contrary the creameries of other kinds had decreased from 310 to 84.

The organization of these co-operative creameries is very simple. The farmers form a society which borrows necessary capital, by means of which a creamery is erected. All the milk produced on the estates of the members must be sent to the creamery. The price for the milk is the same for all and is fixed once a month. A member's share in the creamery is calculated in accordance with the payment he has received for the milk. The number of members and the quantity of milk they supply vary much. Of some creameries there are several hundreds of shareholders.

At some places, it has been arranged so that the members can be supplied with feed, etc., by the creamery. Most of the creameries are also united in strong bodies watching their common interests. But they have not developed the idea any further and not extended the co-operative principles to the farm labourers.

Workmen's Dwellings.

In consequence of the influx to the towns from the country districts, the workmen's dwelling question has assumed considerable importance in our towns. It is therefore of moment to state what has been accomplished in this respect in the larger towns of this country.

In Stockholm. That there was a lack of sufficient workmen's dwelling accommodations in Stockholm was clearly evidenced as far back as in 1896 by an investigation brought about by the Town Council and carried out by K. KEY-ÅBERG. According to the results then received regarding the year 1895, nearly a fourth of the working people in the capital were lodgers, i. e., they hired sleeping-places from other persons and had no dwelling of their own; and the rents paid were in many cases unreasonably high. It was stated that on an average for these dwellings (kitchen counted as room) a rent of 92 kronor (à 1·10 shilling or 0·268 dollar), per annum was demanded, corresponding to a price of 2·83 kronor per cubic meter of the room capacity (8 *sh.* 10 *d.* per a hundred cubic feet).

However, the conditions in this respect were during the following years not ameliorated. On the contrary, a change for the worse seemed evidently about to take place, wherefore an energetic action on the part of the community was rendered necessary. In connection with this a fresh, comprehensive investigation into the dwelling question was made at the public's expense by J. GUINCHARD regarding the years 1900 and 1902 and embracing all dwellings in the Capital up to and including three rooms and kitchen. There it was stated that the rents had been raised very considerably since 1895 and that, owing to this, the relative number of people per room as well as the number of lodgers showed an increase in figures. The yearly rent per room had now increased to 134 kronor and the average price per cubic meter to 3·95 kronor (12 *sh.* 4 *d.* per hundred cubic feet), corresponding thus to an increase of about 40 %. For the sake of comparison it was stated at the same time that for the large dwellings (six rooms and kitchen and thereover) luxuriously fitted up and located in the best quarters, there were paid 239 kronor per room but only 2·80 kronor per cubic meter (8 *sh.* 9 *d.* per hundred cubic feet). It is evident from these figures that the dwelling conditions of the working classes as well as of the people in small circumstances on the whole earnestly demand improvement. In 1903, a *Committee* was formed

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for this purpose by the Town Council, and in the same year proposals were presented by it partly for temporarily remedying the nuisances, and partly for creating new legislative provisions on the subject. The proposals, however, still are under deliberation by the Community.

Omitting what has been done by exclusively private initiative, however, during latter years several measures in this respect have been taken. We give below a brief account of those of greater importance.

At the expense of *the State* dwellings have been provided for the employées of the State Railways; two blocks of buildings have been rented for this purpose.

Family dwellings have been provided by *the city* for 39 workmen employed at the City Water-works. In 1899 the Town Council granted 575,000 kronor for erecting 8 dwelling-houses, with altogether 268 fire-places, for the city employees. Of these dwellings 110 are to consist of 1 room and kitchen and 16 of 2 rooms and kitchen. In 1902 were granted 425,000 kronor for the same purpose. The undertaking is to be regarded as a trial, and will be extended if the result prove satisfactory. Over 1,500 workmen, or persons similarly situated are employed in the service of the city.

Only a few *factories and industrial establishments* have erected dwelling-places for their workmen on a larger scale. Among such may be mentioned the Rörstrand China Works, and J. & C. G. Bolinders Mekaniska Verkstadsaktiebolag (The Bolinder Mechanical Company, Ltd.). The former has erected 19 larger and smaller stone-houses and small wooden-houses. In these and other premises rented by the Company live 378 out of the 900 workmen employed at the works. The latter disposes over 230 dwellings comprising 310 rooms and 201 kitchens.

The great scarcity of dwelling accomodation felt in the seventies gave rise to vigorous action among the *working classes* with a view to their providing themselves with dwelling-places on the *self-help* system. So-called Dwelling Accommodation Societies (Bostadsföreningar) were formed for the building of houses. In the middle of the eighties the movement was at its height. These Dwelling Accommodation Societies owned 64 properties, having a total value of close upon 10 million kronor. In 1896, the number of houses amounted to 67, containing 4,810 fire-places, but the taxation value had fallen nearly $^1/_2$ million kronor. Upwards of 30 % of the capital was invested by the members of the Societies. The occupants of these habitations each possessed his own private abode. The members of these societies were jointly and severably responsible, according to the law then in force, for the enterprise which was accompanied with great difficulties.

The result of these has not been satisfactory. The form of the same has shown itself to be unsuitable, and the payments and the rates of interest were too heavy for the great number of workmen. Many members suffered great loss and building activity ceased.

Among the habitations for workmen, erected through philanthropical endeavours, the following may be mentioned.

Aktiebolaget Stockholms Arbetarhem (The Stockholm Workmen's Dwelling Company, I.td.) was founded in 1892 on the initiative of Miss *Agnes Lagerstedt.* The object of the company is to provide the cheapest habitations for workmen possible, and to work for the moral advancement of the tenants. In this as well as in the enterprises next mentioned, the profit of the shareholders is limited to 4 %. Up to the present 5 middle-sized houses, containing 140 sets of rooms, have been erected. Of these, 29 are single-rooms with combined cooking and heating stoves, which are rented at 120—144 kronor per annum, and 105 apartments containing 1 room and kitchen, for which on an average a rent of 188 kronor per annum is demanded. This rent is likely to be less than in ordinary circumstances by 50—75 kronor. Laundry and Bath-room are accessible without extra cost. The rooms are specially comfortable. An illustration of

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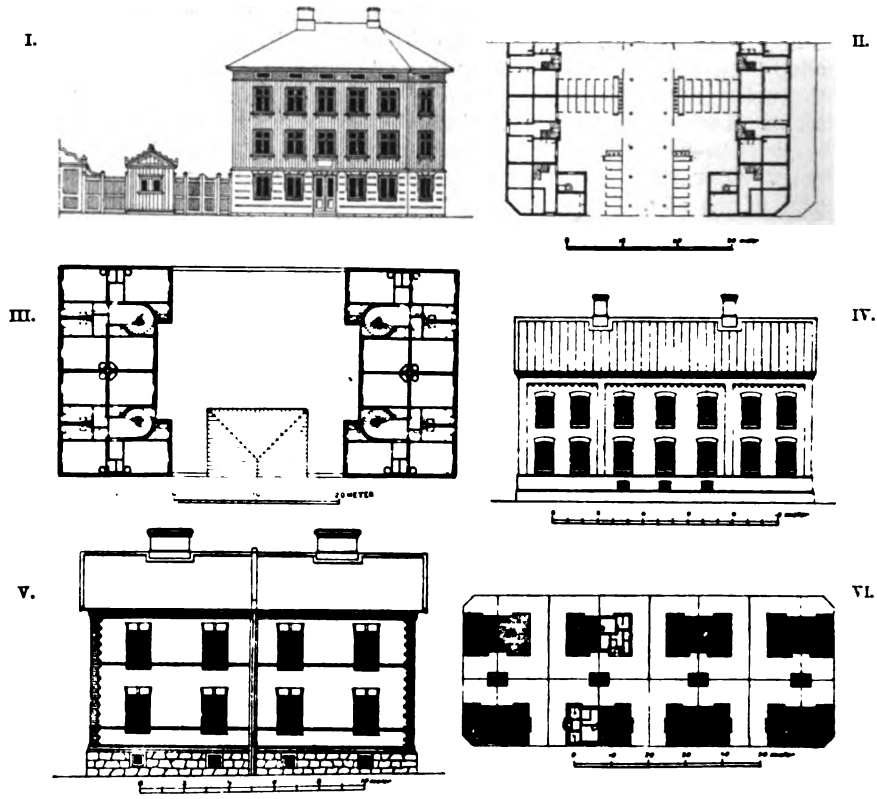
such a room will be found on page 1087. The result of the company's work has been very satisfactory. Rents have been paid punctually, although many of the tenants belong to the very poorest classes. The shareholders have received 4 % on their money. For mutual use, a sick-fund has been formed among the tenants. Religious worship is held in a larger room in one of the company's buildings, where sewing meetings are also arranged for wives and work-shops for the children. A shop has been opened on behalf of the tenants, and the profits are shared among the customers.



I. House erected by the Workmen's Building Society in Gothenburg. — II. Plan of d:o. — III. Plan of house, erected by the Stockholm Workmen's Dwelling Company, Ltd. — IV. House erected by the Robert Dickson Foundation in Gothenburg. — V. House erected by the Workmen's Dwelling Accommodation Company, Ltd., in Gothenburg. — VI. Plan of such houses.

Bostadsaktiebolaget Holmia (Dwelling Accommodation Company, Ltd.) has also for its object the building of cheap and good habitations for the working classes. In Kungsholmen, 28 two-story stone-houses are built in two rows. These houses, which have a frontage of 6·5 meters, contain on the ground floor a flat of 2 rooms and kitchen, and on the upper floor 1 room and kitchen. The cost of erection per fire-place has amounted to 1,600 kronor. In Södermalm (South End of Stockholm), 3 stone-houses (three stories) have been erected at a cost of 1,920 per fire-place. The company has obtained a loan of $1^1/_2$ million kronor from the City for the erection of houses with smaller dwellings.

By *Aktiebolaget Billiga Bostäder* (Cheap Home Company, Ltd.) five one story wooden houses have been built in different parts of the city. In these 94 families live who pay 9—10 kronor for single rooms per month.

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Byggnadsaktiebolaget S:t Erik (The St. Erik Building Company, Ltd.) which was already founded in 1875. Among the dwellings intended for workmen attention should be drawn to those in Skånegatan in Södermalm. They consist of 6 middle-sized stone-houses of two stories, each containing 12 habitations, whereof 8 of one room and kitchen and 8 attics.

Byggnadsaktiebolaget Manhem (The Manhem Building Company, Ltd.; 1894) has erected 24 five-story houses in the Maria parish in Södermalm. The number of

I. II.

III. IV.

I. People's Kitchen at »Manhem» (Workmen's Dwellings of the Manhem Building Company, Ltd., Stockholm). — II. Room in a house erected by the Stockholm Workmen's Dwelling Company, Ltd. — III. Farm laid out by the Society for Own Homes (Östergötland). — IV. Dwelling-house on the Dufbo estate at Sundbyberg, belonging to the Country Home Company, Ltd.

fire places amounts to 986. The rent varies between 125—135 kronor per fire place. The houses are arranged in small habitations of 1 or 2 rooms and kitchens or single rooms; there are, however, a few flats containing more rooms. Each habitation is as a rule provided with a hall; the kitchens are roomy and are provided with water, iron cooking range and pantry. The rooms are particularly comfortable. For the occupants of these houses, who amount to about 3,000, a church has been erected. One flat is occupied by a branch of the Young Men's Christian Association, where lectures and evening entertainments are held. For unmarried persons a public kitchen is established. The company has given 5—6 % interest of its share capital.

Bostadsaktiebolaget Fridhem (The Fridhem Dwelling Accommodation Company, Ltd.) has erected 2 large five-story stone-houses in the Kungsholmen districts, containing altogether 230 habitations of 1 and 2 rooms and kitchen.

In Gothenburg. In the second city of the kingdom much has been accomplished in the important question of workmen's dwellings, owing to the interest of

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private individuals and the facilitation kindly afforded on the part of the city authorities. As early as 1847, the city representatives resolved to erect workmen's dwellings. In 1847/50 there were erected 12 wooden-houses containing 87 habitations, in which in 1890 there lived 249 persons. These city houses were taken over in 1878 by the *Robert Dickson Foundation* (Robert Dicksons Stiftelse), which was established in 1858 by the deceased merchant, Robert Dickson. The Fund, amounting to 330,000 kronor, should be mainly expended in erecting dwelling-places for the poorer classes. Building sites were obtained from the city on most advantageous terms. At the close of the year 1890, the Fund had erected 44 stone-houses with a total of 339 sets of rooms, which were occupied by upwards of 1,500 persons. The rent amounts to 180—240 kronor per habitation of 2 rooms and kitchen, 120—168 kronor for 1 room and kitchen, and 54—102 kronor for single rooms provided with cooking conveniences, all per annum. Every dwelling-house is provided with special rooms set apart for washing and baking; water is led into every house. The yards are roomy and planted with trees. An illustration showing how the buildings look, is shown on page 1086.

Whereas the houses above mentioned were to remain in the possession of the Fund, it was the intention with the houses erected by *Arbetarbostadsaktiebolaget* (The Workmen's Dwelling Accomodation Company, Ltd.) and *Sparbanken* (The Gothenburg Savings Bank), that they should pass over to the possession tenants upon a certain time allowed for payments made in amortization. The former enterprise was initiated by three leading men of the city buying a larger site which was afterwards taken over by the city at the same price. After the plan of the city had been compiled the site in question was again purchased in 1873 by the company then constituted at a cost of 4·7 öre per square foot. The city nevertheless was to make streets and provide them with drainage and water-pipes. 89 houses are built, of which 3 are single-houses, 40 double-houses, and 6 are houses of a transitional character. Double-houses (see p. 1086) consist of two half-houses, divided by means of a fire-proof wall; every half-house contains 2 habitations of 2 rooms and kitchen on the ground floor; and on the upper floor there are single rooms with cooking conveniences, or habitations of 1 room and kitchen. Every half-house shares outhouses and a roomy planted yard. They are allotted the tenants against a sum of 400 kronor in earnest-money and a monthly rent of 52 kronor. Amortization on the property, which is valued at 8,700 kronor, is accomplished in 20 years or thereabouts. Larger houses with a monthly rent of 64—90 kronor have also been erected. The company has given a dividend of 4—5 % on the paid-up share capital.

When the tenants have become owners of the houses, the buildings have in some cases been razed and new larger buildings erected on the site or on the yards as far as building-regulations have permitted; the immense rise in the prices of building-sites have induced such measures. It is obvious that this is not in the interests of sanitation and comfort.

Göteborgs Sparbank (the Gothenburg Savings Bank) has erected buildings in accordance with the same scheme, although on a smaller scale.

Yet another important building-enterprise may be mentioned. In 1872 *Arbetarnes Byggnadsförening* (The Workmen's Building Society) was founded. As the name implies, this was an enterprise undertaken by workmen. Membership of the Society was granted every respectable citizen against an entrance fee of 2 kronor (2·2 shillings) and a weekly payment of 25 öre (3½ *d.*) for 10 years. The houses erected were allotted the members by drawing lots. The Society membership roll increased very rapidly during the first few years in consequence of the scarcity of dwelling accommodation, the role then embracing upwards of 2,000 members. The Society obtained sites from the city at a price of 10 öre per square foot,

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whereas the usual price was 16—20 öre. On these sites 24 houses were built in two rows, parted by means of a wide street. An illustration is shown on page 1086. Each house contains 7 rooms and a kitchen and costs the Society 15,000 kronor, including erection and purchase of site. The bottom story is of stone, and the two upper ones of wood. This kind of house is cheap and easy to build; it is very common in Gothenburg, and has substantially contributed to solving the problem of dwelling accommodation in that city.

After the scarcity of dwelling-places had ceased to be felt, the interest in the Society waned, and in 1896 it was dissolved, when the whole of the reserve fund, about 60,000 kronor, in opposition to the wishes of many, was distributed among the members. During the life of the Society an interest of 5—6½ % on the investments was paid.

Besides this Society there are in Gothenburg about 35 smaller Building Societies, the activity of which is generally based on speculation; the financial result has, as a rule, proved very satisfactory.

Other parts of the country. *Agricultural labourers* generally receive free house-room from their employers, which in many instances is defective and unsatisfactory. A desire has recently been noticeable among these workers to obtain their own homes. The attempts made have proved very satisfactory.

The workers employed at industrial establishments in country districts are also, as a rule, provided with house-room by their employers. This is occasioned by the fact of the proprietors of these industrial establishments usually owning all the land in the vicinity of the factory, and, besides, in consequence of their finding it cheaper to allow the wages partially to be given in »free house-room»; on the other hand, this is accompanied with greater dependence of the worker, which has caused the energetical movement among the industrial workmen for providing homes of their own.

As examples of habitations for workmen at factories in the country, the following may be mentioned.

At the large Iron Mines of *Grängesberg* in Dalarne, a great number of new habitations for workmen have been erected. Each house contains 4 sets of rooms of 1 room and a kitchen, entrance hall, etc.; each set of rooms is entirely separated from the rest, and has its own entrance. The houses, built of wood and painted red, are much liked. Three kronor a month is the sum paid per set, which of course does not represent the rentable value of such dwelling. Only well-known, steady workmen are allowed to move into them. — The unmarried workmen live in barracks, of which the latest contain two rooms each, accommodating altogether 48 persons.

Huskvarna fabriksaktiebolag (The Huskvarna Manufacturing Company, Ltd.) has erected dwellings for renting to their workmen, and also granted building-lots and loans to them to erect houses of their own. Each of the latter is owned by one person, who occupies part of the house and lets the other sets of rooms. Hitherto 133 »own homes» have been erected, comprising altogether 412 sets of rooms. The rent for 2 rooms amounts to 96 kronor, and for 3 rooms to 144 kronor per year. The value of the workmen's houses amounts to 609,700 kronor, on which there is a debt of 130,000 kronor remaining.

Sandvikens Järnverksaktiebolag (The Sandviken Iron Works Company, Ltd.) in the Län of Gefleborg, has erected upwards of 130 workmen's dwelling-houses, which have a fire-insurance value of 1,100,000 kronor. In these 3,674 persons live rent-free. Every habitation has its garden-plot. Water is led in, and there are fountains in the street. The company has erected a church, 4 school-houses, and a bath-house. There is a physician, an apothecary, and a small hospital on the spot, and the workmen receive free medical attendance.

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The Question of »Own Homes».

To the idea of procuring *»own homes» in the country* for people with limited means, the State has long devoted its attention, but it is only of late that it has awakened any lively interest in the minds of the public.

The first decisions of the Riksdag in this question were more of a State financial than of a social nature. At the Riksdags of 1874, 1879, 1887, and 1888 it was decided to sell the smaller Crown estates. The terms of payment, however, made it difficult for people of small means to take advantage of the opportunity. In 1891, the Riksdag requested the Government to ascertain whether people of limited means could not be helped to acquire farms of their own, through the instrumentality of the State. This request caused the appointment of a »farm committee» in 1891, which gave its report in 1892. The proposition made by Government in 1894 to the Riksdag was principally based on this report; the proposition of the Committee to drain wet ground and colonize the enormous expanses of land belonging to the State in Norrland was, however, not taken up, although the examination of these questions was recommended. The Riksdag principally approved of the propositions of the Government. It was therefore decided that an entire or partial division into small farms should be allowed of the Crown estates intended for sale. Furthermore, money was appropriated for investigation of the question of colonization in Norrland. Hitherto land has been leased in this part of the country to private individuals for a maximum time of 20 years, and building-aid has been given on certain conditions.

At the Riksdag of 1899 no less than five propositions were made in the question of »own homes». In these propositions it was pointed out what an unfavourable position the farmhand has in comparison to the city workman. If the farmhands could be provided with farms of their own on favourable terms, not only moral and social advantages for them would follow, but the State ought, in economical and other respects, to derive great benefit therefrom. The help from the State ought to consist in loans with low interest and a long time of amortization. The proposition caused the Riksdag to address Government, requesting to have investigations made in the question of own homes, especially for the working-classes in the country. Consequently the Government appointed a Committee to investigate the matter, and it made its report in 1901. Upon recommendation of this committee the Government has made a proposition to the Riksdag of 1904 concerning loans for »own homes» from the State. According to this the State shall, during the next quinquennium, use, at the most, 10 million kronor of the so-termed workmen's insurance fund for loans, partly for dwelling-places and partly for smaller farms. The borrowers are to be workers, men or women of the age of 25—50, Swedish citizens, and who earn their living principally through manual labour. The value of the farms is, at the highest, to amount to 6,000 kronor, $^5/_6$ of which can be obtained as a loan, while the dwelling may have a value of 3,000 kronor, with a loan amounting to $^3/_4$ at the most. The interest is calculated at $3^1/_2$ % and the time for amortization to 23 years. The loans are not to be by the State to the workmen direct, but the responsibility is to be placed in intermediate hands: Agricultural societies, Associations, and employers. The former would be especially suitable for arranging about loans for the farms, inasmuch as they through their officers come in close contact with the occupiers of smaller farms; the latter would be in a position preferably to work for the erection of workmen's dwellings.

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To promote the establishment of smaller farms and to make them profitable, an energetic work for the instruction and information of the farmers has with great success been undertaken by the State and the Agricultural Societies, which, through subventions for travels for the purpose of study, premiums for well managed farms, offices of analysis, and through information concerning Agricultural co-operation, etc., endeavour to encourage, advise, and support the occupiers of smaller farms.

Through laws in regard to partition of land (the last one of 1896), the Riksdag has endeavoured to facilitate the division of private property. There is, however, still very much to be done in this matter, since the present way of making pourparty is accompanied by rather heavy expenses and many disadvantages.

Of the endeavours made towards procuring »own homes» in *the cities* we have spoken in connection with workmen's dwellings in town (see p. 1084). In Stockholm, there has been a lively activity of late years to get »own homes» for the city workmen in the country just outside the city. Private individuals and companies have for this purpose purchased properties, divided them into building-lots, and sold the lots to workmen, who have themselves built houses on them. Among others, we may mention »Aktiebolaget Hem på landet» (Country Home Co., Ltd.), which has formed a colony for own homes at Dufbo, near Stockholm (see fig. p. 1087). The greatest difficulty is the lack of suitable means of communication. In order to solve this problem, the State ought to offer its aid. Some members of the Riksdag have proposed that the Crown possessions in the suburbs of the city should be devoted to the erecting of own homes, the State retaining the ownership of the land. Hitherto, however, all such propositions have been discarded by the Riksdag.

In some places unions have been formed by the workmen for the purpose of erecting own homes. The largest of these is the *Own Homes Union in Östergötland*, which was organized in 1889. In 1902, the Union consisted of 4,011 members, who owned 29,659 shares of 10 kronor (11 *sh.*) each. There are branch unions to a number of 72 in seven different Läns. Buildings have been erected in cities and in the vicinity of them, as also in the country. The value of these buildings amounts to about 600,000 kronor. On entering into possession of the property 1/10 of its value is paid in cash. The amortization amounts to 2—3 %. The Union has sought a subsidy from the State. In the vicinity of Motala a piece of property has been purchased and divided among the members of the Union. The result has proved satisfactory both for the Union and the farm-owners, and the taxation value of the land has considerably increased.

Sick-relief and Burial Funds.

The Swedish sick-relief and burial funds date their origin, like similar funds in other countries, from the guilds of the Middle Ages, which usually had for one of their objects the rendering of assistance to members in the event of sickness or death. According to the guild regulations of 1669, it even became obligatory for guilds to give such support. The law of 1864, relating to the extended liberty of trade, resulted in the repeal of this obligation, which, however, as early as 1846, was transferred to the handicraft and factory societies established upon the dissolution of the guilds; but the efforts of self-help thus aroused and maintained, which even previously had gained approval within spheres outside the guild movements, have nevertheless, through

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voluntary assistance, continued and, chiefly since about 1875, made considerable progress. As specially effective contributive factors to this end have proved the numerous social movements prevailing during the last few decades, beyond all among the working classes, such as the temperance movement, trade union work, and religious movements, which in many cases have aimed at the establishment of sick-relief and funeral funds (»*funds within private circles*» and »*trade funds*»), partly also the present re-organization of our industrial life, which has made the establishment of similar funds possible in the larger factories and works (»*factory funds*»). A fourth group among the present sick-relief and funeral funds constitute the so-called »*general funds*», organized after the same pattern as the old guilds, the greatest number of these comprising the so-called »Hundred Men Societies», which originated about 1875.

According to the quinquennial reports of the Governors, whose returns in this respect can, however, hardly claim to be complete, there existed at the end of 1895, in the whole Kingdom, 1,519 self-help funds for the rendering of assistance in cases of sickness or death. Out of the total amount expended for support, as well as of the capital on hand, no less than $^1/_3$ of the grand total for the whole Kingdom is ascribed to Stockholm alone. The number of members in all the funds may in round figures be estimated at 300,000, comprising about 6 % of the population, against nearly 140,000 members in 1884, or 3 % of the population. — The largest funds are the Sick-relief and Burial Fund of the Temperance Friends (Nykterhetsvännernas allmänna sjuk- och begrafningskassa; 17,217 members at the end of 1900) and the Sick-relief Fund of the Temperance People (Nykterhetsfolkets sjukkassa; 10,799 members), both with a sphere of action embracing the whole Kingdom, and, further, the Stockholm association »Unity Gives Strength» (Enighet ger styrka; 12,051 members).

Of the 1,519 funds in 1895, 1,251 granted both sick-relief and burial assistance, 117 sick-relief but not burial assistance, and 151 burial assistance but not sick-relief. Among these funds, however, there exist not a few that bestow other benefits upon their members than support in cases of sickness and death, such as assistance in cases of emergency, temporary support, pensions, or support for maintenance in old age, traveling aid, improvement in social and intellectual respects, etc. In some funds insurance holds good for the wives, children, and widows of the members. Entrance is obligatory in most factory funds. Employers contribute, as a rule, to some extent, either with cash or an equivalent, e. g., free medical advice, free medicine, or the like.

Altogether, during 1895, something like 49,000 persons or their relations received support from these funds to the amount of 1,800,000 kronor. The balance of the funds at the close of the year amounted to about 5,675,000 kronor, and during the same year the fees of the members amounted to about 2,250,000 kronor.

As mentioned, the Swedish sick-relief system has developed independently, without any intervention of the State to the introduction of obligatory sick insurance. Of later years the State has to a certain extent come forward as a patron of the sick-relief fund movement, namely by means of the law of October 30, 1891, relating to **Registered sick-relief funds,** the establishing of which law constitutes *one* among the results of the exertion of the first Workers' insurance committee.

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According to this law, which, however, does not make registration compulsory, sick-relief funds whose regulations are drawn up in accordance with the provisions prescribed, can be registered on the following *conditions* among others, namely: *a*) that the fund comprises at least 25 members; *b*) that the Board consists of Swedish subjects and comprises at least 3 persons; *c*) that the means of the funds may not, except for paying management expenses, be used for other purposes than support in cases of sickness, and eventually for funeral assistance. The *privileges* enjoyed by registered sick-relief funds are among others, firstly a legally established position and the exemption from distress upon the support rendered by such funds; secondly the right to an annual so-called management contribution, which, after having been increased several times, at present amounts to 1·50 kronor (1 *sh.* 8 *d.*) per member up to the number of 100, 1 krona (1·10 *sh.*) for each member from 101 to 300, 50 öre (6·6 *d.*) for each member from 301 to 2,600, and 25 öre (3·3 *d.*) for each member beyond that number. Nevertheless, in conjunction with this, it is stipulated that the fund's own income must have amounted to at least as much as the amount of the management contribution calculated on these bases. Upon registration follows the *obligation* for the fund to issue an annual statistical report of its work.

According to the reports published by the Home Department there were, in 1900, 1,443 funds registered with almost 253,500 members, of whom about 61,000 were women. In 772 funds the membership was below 100; 532 had between 101 and 300; and only 139 above 300 members, of which but 5 exceeded 2,000 members. Men only were admitted to 400 funds, 25 were exclusively for women, while on the other hand 1,018 were open for both sexes. — The *receipts*, which altogether amounted to 2,890,193 kronor (à 1·10 *sh.*) were distributed as follows: entrance fees 69,019 kronor, regular fees 1,749,804 kronor, extra fees 467,155 kronor, State contribution 228,764 kronor, fines, etc., 33,946 kronor, interest 176,135 kronor, etc. Among the *expenditures*, 2,377,554 kronor, are included cash sick-relief 1,695,017 kronor, burial assistance 312,284 kronor, and management expenses 213,194 kronor. The *balance* of the funds at the expiration of 1900 amounted to 4,272,167 kronor, and the year's work gave altogether a surplus of 512,639 kronor.

With regard to the *number of cases of sickness* among the members of the registered funds, the following figures, being the average for the years 1894/98, may be given. The number taken ill in proportion to the membership, amounted to 23·4 % among the men, and 18·8 % among the women. The number of cases of sickness in per cent of the membership, amounted for the men to 28·9 %, and for the women to 23·2 %. On an average every case of sickness required sick-relief for 20·1 days. Distributed over the entire membership, the number of sick-days will consequently amount to 5·5 per annum. All these figures have remained almost unchanged since the first investigation into the matter, in 1884.

Registration was embraced with but little interest by the funds the first few years after the law came into existence, depending partly upon the very limited contribution from the State at that time and partly upon the great dislike inherent with the public in general for such public supervision as registration implies. As State assistance has increased, participation has certainly become more animated, but nevertheless there are still many funds that have neglected to avail themselves of registration, which, however, has undoubtedly essentially contributed to strengthen the financial position of the sick-relief funds and to support them in their work.

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Pension Funds.

Among the Swedish pension funds two groups are distinguishable. The one embraces those funds that, like the sick-relief and funeral funds, owe their origin to voluntary union for mutual support. These being the most numerous, though less important in extent, as a rule, grant pensions only to such as are in want; for which reason the assistance rather resembles relief than pension in the ordinary sense of the word. The number of pensions acquirable is often also fixed and the amount of the pension depends upon the accessible means of the fund. The funds founded at the initiative of employers, and which, as a rule, receive support from them, are of another character. Membership is obligatory in such funds for all persons employed in the sphere of work in question; and the member's right to pension commences when a fixed age is attained, usually concurrent with the age fixed for retirement from service; and at the death of the husband or father, the widow and children eventually receive pensions irrespective of the financial position of the estate. Such are the arrangements of the large pension funds for the servants of the State and for those in the employment of the communities, also of those funds which of late have been established at different places for persons employed by private concerns, such as railway companies, large industrial establishments, and the like.

Our knowledge of the existing pension funds, like that of sick-relief funds, is to a certain extent imperfect. However, according to accessible information the number of the former (with the exception of those of the »Seamen's Register Offices», see p. 973) in 1895 amounted to 180, representing a cash balance of about 110,300,000 kronor at the expiration of 1900. Two funds were even established before the beginning of the 18th century, 18 during the 18th century, 38 during 1801/50, and 115 since the middle of the 19th century. No less than 63 funds with a combined capital of 102,797,937 kronor (or about 93 % of the capital of all the funds), had their seats in Stockholm, but it must, however, be borne in mind that several of these funds operated over the whole country. Besides the funds accounted for, with statements of particulars in Table 166, page 1096, the respective capitals of the following, at the expiration of 1900, may be mentioned: The Pension and Maintenance Fund of the Steamship Captains' Association (143,476 kronor), The Book-and Music-sellers' Pension Association (321,401 kronor), The Mercantile Clerks' Pension Association (500,000 kronor), The Dramatical and Musical Artists' Pension Association (206,026 kronor), The Artists' and Authors' Pension Association (237,852 kronor), The Swedish Journalists' Maintenance, Sick-relief, and Pension Society (173,285 kronor), The Swedish Lady-teachers' Pension Association (550,963 kronor), The Pension Institution for Lady-teachers of Swedish Collegiate Schools for Girls (454,274 kronor), which since 1897 inclusive receives State subvention of 10 kronor per member, The Apothecaries' Life Annuity and Pension Fund (980,731 kronor). Even among the provincial funds are to be found a few whose operations extend

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beyond the places where they are established; such is the case, among others, with the Royal Navy Pension Fund, Karlskrona, and the General Widow and Orphan Fund, Gothenburg (2,020,190 kronor).

With regard to respective cash balance at the close of 1895, the funds are summarized as follows: 29 funds with less than 10,000 kronor each; 60 funds with 10,000 to 50,000 kronor; 26 with 50,000 to 100,000 kronor; 45 with 100,000 to 500,000 kronor; and 20 with more than 500,000 kronor, of which 14 exceeded 1,000,000 kronor. From the following statement will be seen within which classes of society the funds operate:

	No. of Funds.	Capital in 1895. Kronor.
For persons in civil service (including clergy and common-school teachers)	48	55,828,998
» Military men	17	11,444,987
» Persons in the employ of the communities	13	2,744,695
» Persons employed by private railway and tramway companies	14	2,482,701
» Tradesmen	12	2,435,754
» Manufacturers and Artisans	11	876,436
» Seamen (excepting the funds of The Seamen's Register Offices)	15	639,641
» Factory hands	13	274,305
» Persons of other trades	18	3,481,595
General funds	15	14,439,255
Funds within private societies	4	136,355
Total	180	94,784,722

Some information respecting the work of all the funds during 1900 will be found in Table 166.

Space does not allow of a more detailed report for the special funds, as for instance the amount of the fees, terms on which pension is granted, the amount of the pensions, etc., but in such questions reference may be made to the brief particulars given about some of them in the respective divisions above.

As previously mentioned in this work, no public institution for workers' pensions has been organized in Sweden. On the initiative of the State, the pensioning of one body of workers not in its service, namely the **Seamen,** has, however, been arranged. For this class there exist two pension funds, the one in connection with the Seamen's Register Offices (Sjömanshusen), to which the members pay their fees in order to obtain pensions for themselves and their families; the other is the Merchant service Pension fund, which is exclusively supported by the State. A report respecting these institutions has been given previously (page 973).

In connection with this account of pension funds strictly founded on the self-help principle may also be mentioned many private benevolent **funds** which, as a rule, have been established through individual philantropy for the bestowal of pensions upon needy persons, without their having had to contribute themselves. Including the Merchant service Pension fund, there existed in 1895 no less than 750 similar institutions, which during the same year rendered support to 27,821

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TAB. 166. *Pension Funds, in 1900* (excluding the Seamen's Register Offices). A krona = 1·10 shilling or 0·268 dollar.

Funds.	Date of Foundation.	Members' fees. Kronor.	State contribution.[7] Kronor.	No. of pensioned.	Amount of pensions. Kronor.	Balance at close of year. Kronor.
The Pension Institution of the Civil service	1826	82,084	74,272	130	89,442	11,584,928
The Widow and Orphan Fund do.	1826	[5]) 276,539	—	1,927	558,315	242,375
The Army Pension Fund	1756	188,386	1,922,101	1,670	2,304,026	3,747,794
The Army Widow and Orphan Fund (old)	1817	1,895	29,075	396	47,563	353,164
The Army Widow and Orphan Fund (new)	1883	142,212	67,708	471	140,900	6,054,436
The Navy Pension Fund[1]	1642	119,174	379,658	1,107	536,636	2,242,383
The Pilot Service Private Pension Fund[2]	1885	31,075	—	86	9,165	530,123
The Pension Institution of the State Railway	1872	289,779	213,024	723	652,159	9,036,724
The Widow and Orphan Fund of the State Railway	1872	294,980	—	848	249,080	8,779,161
The Telegraph Pension Institution	1874	35,003	90,046	92	160,835	3,075,662
The Telegraph Widow and Orphan Fund	1875	21,127	5,000	59	26,791	683,177
The Customs Private Pension Association[3]	1805	59,991	10,000	923	95,428	339,773
The Clergy's Widow and Orphan Fund[4]	1874	166,357	—	955	459,605	10,443,384
The College School Teachers' Widow and Orphan Fund	1878	73,800	69,851	260	152,159	3,405,254
The Common School Teachers' Pension Association	1866	274,994	502,273	1,282	613,850	11,871,609
The Common School Teachers' Widow and Orphan Fund	1875	136,998	63,500	703	100,032	4,604,777
The Infant School Teachers' Old-Age Institution	1892	88,170	7,791	351	38,503	427,742
The Private Railways' Pension Fund[2]	1888	341,107	—	—	15,859	2,301,906
The General Widow and Orphan Fund	1784	46,441	—	531	469,286	12,567,814
Various (161)[8]	—	[6]) 800,000	10,826	4,561	743,985	17,972,246
Total	–	**3,470,112**	**3,445,125**	**17,075**	**7,463,619**	**110,264,432**

[1] Includes also the pilot service. — [2] Grants pensions to employees as well as to their widows and children. — [3] Widow and orphan funds. — [4] The reports refer to the financial year 1/5 1900—30/4 1901. — [5] As a contribution from the pension institution the fund has received 269,579 kronor. — [6] In round figures. — [7] In order to obtain a statement of *all the expenses of the State for pensioning*, should be added to the sum of 3,445,125 kronor, firstly the contributions to the three pension funds: The Merchant service Pension Fund (95,000 kronor), Vadstena Soldiers' Out-Pension Fund (243,640 kronor), and the Invalid Pension Fund (60,350 kronor); secondly the direct pensioning of the employees of the State, namely on the so-called General Ademption List (2,184,951 kronor), Customs Pension Establishment (327,010 kronor), Post Office (74,942 kronor), National Debt Board (14,567 kronor), and the Bank of Sweden (59,376 kronor), in addition to which come the pensioning of sailors belonging to the Royal Navy and the Pilot service (197,471 kronor) and the General Military Pension Fund (41,232 kronor) for Widows. The State's total expenditure for pensioning during 1900 thus amounts to **6,743,664** kronor. This sum does not, however, include such State contributions as certain widow and orphan funds enjoy in the form of share in fines, etc., which for instance amounted to 12,896 kronor in 1895 for the Customs Private Pension Institute, and for the State Railway Widow and Orphan Fund to 109,740 kronor in 1900. — [8] These statements regard the year 1895.

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persons to a total amount of 1,327,864 kronor; the capital of the funds at the expiration of the year amounted to 28,710,118 kronor. Among these funds are included the following, standing under the supervision of the Exchequer Department and having been founded by public funds for the support of soldiers, especially the common soldiers, namely, the Vadstena Soldiers' Out-Pension Fund (4,398,302 kronor in 1900), the Invalid Pension Fund (2,900,988 kronor), the Conscript Invalid and Pension Fund (1,627,323 kronor). During 1900 these three funds together rendered support to 16,804 persons to the amount of 503,646 kronor.

Benevolent Institutions, Endowment Funds, etc.

In the denomination »benevolent institutions» we generally include endowment funds for various purposes: stipend funds, pensionary funds, sick-relief funds, and similar institutions, etc. Official statistics for 1895 (quinquennial reports from the Governors of the Läns) specified 9,019 similar institutions with a total capital of 237,750,904 kronor.

These foundations, however, differ so widely that a summary made in this manner is to a certain extent misleading. For instance, in this category are included the sick-relief and burial funds, etc., so common nowadays, supported by members' subscriptions, and which therefore can only improperly be termed »benevolent institutions». There existed 1,704 of these self-help funds in 1895, representing a capital of 101,439,763 kronor. It should be noted that certain of these have received endowments or contributions from the State or from employers a. o., whereby their character as »self-help societies» is to some extent inconsistent. Reports referring to these funds are to be found in previous articles.

The remaining benevolent institutions mentioned in the report of 1895, were classified as follows according to their objects.

	Funds.	Capital.
Funds for poor-relief proper	2,135	22,087,224 kronor.
Institutions for the care and education of children	1,911	29,882,678 »
Scholarship and educational funds	1,706	31,801,080 »
Funds for sick-relief (not self-help)	322	11,730,906 »
Pension funds (without fees)	750	28,710,118 »
Other funds	491	12,099,135 »
Total	7,315	136,311,141 kronor.

Of the above, the pension funds have previously been dealt with on page 1094. Taken in a wider sense, the majority of these institutions are to some extent of a kind to be considered as poor-relief funds, or in any case to have for their object the relief of the poorer classes; on page 257 an investigation is made, according to which a capital of no less than 77 million kronor out of the above total of 136 million kronor might be transferred to such poor-relief funds.

The most important of all the Swedish institutions of this nature is the newly established Nobel Foundation (page 378), with a capital of more than 30 mil-

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lion kronor; it is not included in the preceding Table, which refers to 1895. For the same reason the following are not included: the fund of 2½ millions collected in commemoration of the jubilee of King Oscar II for the purpose of founding Sanatoriums for consumptives (see page 247); the newly established Röhss Fund in Gothenburg amounting to 1 million kronor, for practically the same purpose as the Renström Fund (see page 382); and Aug. Abrahamson's Institution Nääs' Sloyd Teachers' Training School with a capital exceeding 1½ million kronor. Apart from the pension funds, the largest of the institutions included in the Table are: The Public Orphanage in Stockholm, with a capital of 5,286,000 kronor; the Royal and Hvitfeld Scholarship Fund in Gothenburg (for scholarships at the Gothenburg State Colleges and the Universities), with a capital of 3,417,000 kronor; the Stockholm Home for the Sick, 3,476,000 kronor; Längman's Donation Fund (see page 382), 2,508,000 kronor; the Gothenburg Museum, 1,706,000 kronor; John Söderberg's (larger) Fund attached to the Stockholm Private University, 1,872,000 kronor; Gillberg's Foundling Hospital in Uppsala, 1,307,000 kronor; the Freemasons' Foundling Hospital at Kristineberg, Stockholm, 1,502,000 kronor; Renström's Fund in Gothenburg (see page 382), 1,348,000 kronor; the Bergian Gardens in Stockholm (see page 376), 1,032,000 kronor; Crown Princess Lovisa's Children's Infirmary, 1,464,000 kronor; the Gothenburg Poor House, 1,165,000 kronor; Axel and Sofia Alm's Institute in Stockholm (reformatory school), 1,105,000 kronor; the City Alms Houses for Widows in Stockholm, 1,048,000 kronor; the Robert Dickson Foundation in Gothenburg (see page 1088). 1,201,000 kronor; the City Alms Houses in Stockholm (for men), 1,370,665 kronor; Friends of the Honest Poor, in Stockholm, 839,000 kronor; John and Mathilda Lenning's Home for the Sick in Norrköping, 830,000 kronor; the Gothenburg Home for the Sick, 1,013,000 kronor; the Fröberg Institute in Kalmar (for neglected and refractory children), 796,000 kronor; the Eugenia Home in Stockholm (for incurable children), 1,493,000 kronor; the Letterstedt Association (see page 381), 770,000 kronor; King Oscar I Memorial Fund, 676,000 kronor; Lundgren's Fund attached to the Private University of Gothenburg, 586,000 kronor; David Carnegie's Donation Fund to the Gothenburg Private University, 553,000 kronor; Lars Hierta's Memorial Foundation (see page 381), 599,000 kronor, etc.

Of all the institutions included above, 61 were established during the 17th century or even earlier, 140 during the first half, and 499 during the latter half of the 18th century, 1,581 during the first half, and 4,663 during the latter half of the 19th century (up to 1895); the date of foundation of 371 is not known. It must be borne in mind that various similar institutions exist, which have not yet been put on the official list (quinquennial reports of the Governors).

Upon the proposal of the Riksdag a law is being drafted to institute a general **supervision** of the utilizing and administration of donation-funds. At present the control cannot in every case be regarded as satisfactory.

Private Social Activity.

Institutions of different kinds purposing to relieve distress or socially to educate such members of the community as are in need of protection and care, are already previously accounted for under different headings, especially if the work in question be connected with public or private relief of the poor.

But, besides that, a many-sided activity is nowadays exercised, which is not of the nature of poor-relief but forms a link in the conscious

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endeavours of the time to bring together the different classes of society and to make as many as possible among the members of the community participant of the fruits of civilization. A great part of this activity is also previously accounted for, namely as far as it forms a link in public instruction. In this connection accounts have been given of the movement for people's libraries (p. 395) and public lectures (p. 316), and partly also such activity has been accounted for as has for its object the physical and moral well-being of the school children, such as vacation colonies (p. 298), work-shops (p. 303), and schools for abnormals and neglected children (p. 305).

A great part of private social work in the capital as well as in the provinces is always directed to the **care and education of the children.** A considerable number of orphanages are maintained partly by societies, and partly by private individuals, and there are day-nurseries in most of the larger towns. But, as a rule, social work of this character has principally been concerned with children in the school-age. Of late years one has, however, become awake to the necessity of a good care also being afforded the infants, and of spreading a knowledge about the rational care of children. In 1900, *Sällskapet Barnavård* (Society for the care of children) was formed in Stockholm with the object of exciting interest in and spreading knowledge concerning the care and bringing up of children. This society, which counts several prominent physicians as members of its Board of directors, has established in the capital an institution for the training of children's nurses, where practical as well as theoretical instruction is imparted in the care of infants. Poor mothers who are prevented from taking care of their own little ones by work outside the home, may against a trifling fee leave their children there, either during the day only, or else also during the night. Only children under 2 years of age are received; a most painstaking care is afforded them, and information and advice are given the mothers with regard to the care of them. The pupils at the institution ought to have gone through the common school and to have reached the age of 17. The course lasts three months, and the fee is 30 kronor per pupil for instruction, board, and lodging. In 1903 a similar institution was opened in Lerum, near Gothenburg.

Föreningen Mjölkdroppen (Milksupplying society »The Milkdrop»), which was formed, in 1901, on the initiative of Dr. M. Blumenthal, has for its object, by distribution of milk mixtures suitable for infants, to provide the proper food for such little ones as cannot for some reason or other get the natural food. The milk is sterilized, and six bottles, food for a day and a night, may be fetched every morning by the mothers. Once or twice a month the children are to be shown up and weighed, when they are examined by the physician. Clothes for the little ones are lent free of charge, but are to be returned clean and mended. In 1903, milk was provided for 75 children daily. The yearly cost per child is calculated at 100 kronor. »The Milkdrop» endeavours by the side of its chief activity to impart to the mothers of the children knowledge concerning the proper care of the little ones. After the pattern of this society in Stockholm there have been established similar institutions in Gothenburg, Malmö, Norrköping, and Karlstad.

Östermalms Nya Barnkrubba (The New Östermalm Children's Day-nursery) is an institution supported partly by the parish poor-relief Board, and partly by private individuals, where children from 1—8 years of age are received to be cared for during the day. Different from the rest of the day-nurseries in Stockholm, at which the children certainly get food and are looked after but nothing is done to occupy and develop them, this institution employs a Kindergarten

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teacher. The children are busied with games, gymnastics, handiwork, drawing, singing, etc.

Children's Homes, maintained by the communities and religious bodies, by societies and private individuals, are met with to a great number in the towns as well as in the country districts. In Stockholm the largest is the Free Masons' Children's homes. In Gothenburg a society called »the Ants» has since 1897 established 5 children's homes in different parts of the city, with 10 children in each. The cost for each home is calculated at 3,000 kronor per annum. The Poor-Relief Board contributes 60 kronor for each child. Other expenses are met by the Society, and by interest on the means donated. The children are received at an age of 2—4, and are allowed to remain until they are confirmed. They participate in the instruction at the common school.

In consequence of the mothers having, by work in factories or in other ways, to contribute to the support of the family, the children of the poorer classes are often left without any care whatsoever after school hours. The so-called *Workshops* (see p. 303) provide a refuge for a great number of these children during some hours of the morning or afternoon, and exercise an educative and elevating influence.

In the Östermalm parish of Stockholm, *Föreningen Barnavärn* (protection of children) established in 1896, a kind of home where boys that are left without proper care and attention are received in order to be protected from the dangers of street-life. They go there directly after school. After a dinner meal, lessons learnt, and an hour for play, they are kept busy with sloyd, bookbinding, and easier kinds of handiwork. Before going home in the evening, they get a meal. In 1902 there was an average of 29 boys per day visiting this institution. *Katarina Barnavärn* is the name of a similar institution for girls, established in 1897 in the Katarina parish of Stockholm. The girls are given some house-hold work to do. The cost per child a day has been 30 öre (4 *d.*). In 1902, 25 girls were received daily. *The Mosaic Church* in Stockholm has an institution arranged according to the same plan for boys and girls jointly. 50 children attend daily after school hours, are fed, busied with doing their lessons, mending their clothes, practicing basket-work, sloyd, and other handiwork. In Gothenburg there also exists a »Barnavärn», established in 1903 on the same principles, and receiving 20 children.

As soon as the children commence attending the common school, the poorest pupils, at least in the capital and the larger towns, are provided with necessary clothing and shoes and get a sufficient dinner meal. Innumerable societies all round the country have for their object the **clothing** of poor school children. Of these may be mentioned Sällskapet Jultomtarne (Santa Claus' Society) in Stockholm, founded in 1870, which every Christmas gives a complete set of clothing to 200 children. Many societies distributing clothes for newly born infants are met with both in Stockholm and the smaller towns.

Of late one has begun to see the necessity of also doing something for **the rising generation.** The young, who at the age of 13—14 have closed their common-school education, and in consequence of that are left in too great a freedom, are only too often led astray and become demoralized. *Sällskapet för befrämjandet af förädlande ungdomsnöjen* (useful amusements for the young), formed in Stockholm in 1901, aims at keeping the young together and excercising an educative and elevating influence on those having left the common school. This society, which consists of local branches — at present 4 — under the direction of a central Board, has regular meetings with lectures, music, and games; endeavours to bring about comrade associations; and provides opportunity for gymnastics. During 1902 the number of children at these socials amounted in the Östermalm local society to about 300. The two Associations *Kristliga Föreningen af Unge*

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Män and *Kristliga Föreningen af Unga Kvinnor* (Y. M. C. A. and Y. W. C. A.) are both carrying on an important work for the good of the young people of more mature age, especially at the larger associations of Stockholm and Gothenburg. A great number of sub-societies exists in the rural districts. The Y. M. C. A. arranges courses of instruction, discussions, gymnastics, and summer-excursions for young men, etc. In Stockholm the Association has formed a sick-attendance corps. Of more practical social activity carried on by the Y. W. C. A. we may especially mention its registry office, its social evenings with lectures and discussions on important social questions, its Evening home for factory girls, where instruction is imparted in sewing and gymnastics, its summer home, where, at a low cost, board and lodging are afforded members of delicate health. The *Y. W. C. A. in Gothenburg* provides dinner for young shop-women chiefly; the *Y. W. C. A. in Norrköping* has recently opened a boarding-house for female workers; the *Y. W. C. A. in Östersund* has a housekeeping school, and many of the smaller societies bearing the same name are working — exclusively, of course, on religious ground — for the elevation of young women of the working class. — *Sällskapet för folkundervisningens befrämjande* (Society for promotion of popular instruction) was established as early as in the middle of the 19th century, when the common schools were still undeveloped, for the object of providing continued instruction for gifted children of the poorer classes upon leaving the common school. The Society's school has of late been reorganized, and receives only female pupils from 14 years of age, to whom, against a trifling fee, instruction is given in the subjects commonly embraced by the school curriculum, besides dressmaking, needlework, and cooking. The cookery course — practical and theoretical — is especially excellent.

Only lately a beginning has been made in Sweden to introduce instruction in cooking and housekeeping in the girl schools. To fill the lack of such an institution in some degree, **Household schools** have been established in towns as well as in rural districts, intended partly for girls who have finished school, partly for girls from the wealthier classes, partly for both together. Subjects of instruction are generally cooking, washing, ironing, baking, sometimes also butchery, sewing, weaving, and, of late, also theoretical instruction in household economy. The oldest of these schools is the *Gothenburg practical household school* for girls, established in 1865. It has its own building, bakery, shop, and a day-nursery, so that the pupils also may learn the bringing up of children. The course is free of charge and takes two years. Among other similar schools we may mention *Carnegie's Household school* in Gothenburg, established in 1891 for the daughters of the workmen at the sugar-works of the firm, and the *Practical Household school in Stockholm*, established in 1870 and intended for the training of maidservants. This last mentioned school (with a three years' course) has its own building, bakery, and four shops; it is owned by a joint-stock company.

Cookery-schools. In 1882, Mrs. Anna Hierta-Retzius established a school in Stockholm with a subvention from Lars Hierta's Memorial Foundation, and with German and English cookery-schools as a pattern, in which school only instruction in cooking and household economy is given. It is intended partly for girls from 12—14 out of the highest classes of the common school, partly also for older girls from the working classes, who have finished school, besides which admission is also granted against a double fee to a small number of young women from other classes of society. The course lasts 3 months; the number of pupils in each class has been 10 to 15. The food is served by portions to dinner guests, by means of which the school has been self-supporting during the last fifteen years. Through this school, instruction in household economy was in 1891 introduced at the Higher Seminary for Lady Teachers (Högre Lärarinneseminariet) in Stockholm, and the Normal School for Girls, besides which the

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first school for cookery teachers and the school-kitchen in the Maria parish of Stockholm originated from it. After the pattern of this first cookery-school several such schools have been established in Stockholm as well as in the country towns.

Training schools for lady teachers in the school-kitchens exist in connection with the Higher Seminary for Lady Teachers and the Atheneum for Girls in Stockholm, at The School for Household Economy in Uppsala, and at the school-kitchens in Gothenburg. In this connection ought also to be mentioned the cookery-courses for factory women arranged by Miss Ingeborg Walin, headmistress of the housekeeping school connected with the Training School for Lady Teachers, at which instruction is imparted free of charge 2 evenings a week during 3—4 months.

Workmen's homes. An undertaking of great importance for the well-being, physical as well as moral, of workmen's families, is the *Stockholms Arbetarhem* (Workmen's Home, see p. 1085), where cheap rooms are let out, and an educative and elevating influence is exercised on the tenants. In 1901, a *Workmen's Hotel* was opened in Gothenburg for about 120 persons by Aktiebolaget »Labor». The Hotel is intended for young, unmarried workmen, and is arranged partly according to the pattern of the Rowton House in London, with a library, reading-room, smoking-room, bath-room, etc. *Föreningen Hem för arbeterskor* (Home for working women), under the direction of Miss Gerda Meyerson, has for its object to provide working women in Stockholm with good lodgings at a cheap rate, and in that way avert the dangers of the in-dwelling system. The Society has established two Homes, with furnished rooms for 2 à 3 working women in each, meeting-room, library and papers, and a common kitchen, in which the tenants themselves cook their meals. At these Homes evening socials are arranged every week, at which lectures are held, concerts are given as well as courses of instruction in the Swedish language, in writing, dressmaking, cooking, etc. The two Homes can together accommodate 50 working women. After the pattern of these homes, *Föreningen K. F. U. K.* (Y. W. C. A.) *in Norrköping* and Miss Beatrice Dickson of Gothenburg in 1903 opened each a home for working women, both on a decidedly religious ground.

Other social activity. Since 1883, a *Sewing Society* for factory girls has existed in Gothenburg, which now has a property of its own with a library, and where dinners are provided for working women. Similar Sewing Societies have subsequently been organized at several places in Gothenburg and its environs. *Föreningen för modermöten* (Mothers' meetings) in Uppsala likewise arranges sewing meetings principally for married women of the working class. Instruction is imparted in sewing and mending, the society purchasing material for articles of clothing, which afterwards may be bought by those who made them. At the sewing meetings there are lectures and conversation on the care of children and home.

Female members of the Heimdal Society of Students have *evening socials* and lectures for working women. In other provincial districts this kind of activity has, however, not yet been introduced. There exists indeed a great number of lecture societies, but their aim is not of the same character as these socials, where opportunity is given for personal contact and exchange of thought between persons of different classes of society. Such an enterprise is the one started by the authoress Miss Ellen Key in 1893, under the name of »*Socials for women of different classes of society*». The object of these socials is chiefly to bring together women of the higher classes with working women. A great number of artists, lady teachers, and ladies noted for their social activity participate in the socials. A larger enterprise with the same object of smoothing down class distinction, are the societies which, under the common name of *Studenter och Arbetare* (Students and Workmen), are at work in

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Stockholm, Uppsala, Gothenburg, and Lund. The Uppsala society was the one first formed (1886), but the Stockholm society is the largest and most active. It consists of about 700 members, male and female, has a club-hall of its own, a library, and a summer home. The Society provides courses of instruction in languages, etc., and lectures and discussions, private as well as public, are often held. The main importance of the societies at work in the University towns consists in bringing together the studying and the labouring classes, thereby endeavouring to counteract misunderstanding and prejudice and to bring about a broad-minded and impartial conception of the social questions.

In 1888, *Kvinnliga gymnastiksällskapet* (Women's gymnastic society) was founded on the initiative of Major Carl Silow. Its purpose is to give women who have their occupation in factories, sewing-establishments, shops, etc., an opportunity of taking gymnastics. Exercises arranged by this society, take place at the Central Institute of Gymnastics during Oct. 1—May 15, and have been frequented by about 200 members a year, who were distributed on two divisions, with exercises twice a week for each division. The exercises have from the beginning been led, without compensation, by interested female gymnasts. The expenses for a hall, etc., and for gymnastic costumes for members without means are defrayed out of the interest of a donation received from Lars Hierta's Memorial Foundation, and out of the fees of 1 krona (1·10 shilling) for the autumn and 1·25 krona for the spring term paid by each member.

Föreningen för sömmerskor (Dressmakers' society) was founded in Stockholm in 1880 by Mrs. E. Nyström, née Rosenius. The members, numbering about 500, pay 15 öre (2 *d.*) a week (after 40 years, 25 öre) to a sick-relief fund for free medical attendance and medicine. In case of severe illness, they receive 75 öre per diem during at most thirteen weeks a year. Fifty-eight of the most suffering among the dressmakers received, in 1903, a month's rest free of charge at the society's Summer home or at some watering-place. The cost of this is defrayed by voluntary contributions. In winter the dressmakers gather one Sunday a month to a meeting paid for by friends of the society, which has 350 paying, so-called honorary members. From the surplus of their contributions a sick-relief fund has been formed to meet casual, severe distress, and a pension-fund, which, through donations, at present amounts to 29,541 kronor. In 1889, a Förening för sömmerskor (Dressmakers' society) was organised in Gothenburg, which affords opportunity to members of delicate health of staying in the country or at some watering-place during summer. Every year about 170 members are thus benefited. There are also several smaller societies, as for instance in Sundsvall, where meetings with lectures and music are held for the members, and where the Board of management, different from what is the case in the former two societies, exclusively is constituted out of the members themselves.

For such unfortunate women as have fallen but wish to amend their lives, several smaller Homes are in activity, as, e. g., *Mamre* in Norrköping, which subsequently was reorganized into a convalescence home for poor sick children, and *Magdalenahemmet* at the Deaconesses' institute in Stockholm. The *Waterloo* home in Gothenburg was founded in 1875. During the period of its existence about 65 % of the women there received have returned to an honourable course of life. *Hemmet Fristad* is an educational institution for fallen women, founded on the most modern principles. It is located at Bromsten station, in the immediate vicinity of Stockholm, and has principally through the generosity of Mr. Carl Cervin, a banker, developed into a really model institution of its kind. When the home commenced its activity, in 1896, it rented a small suit of rooms, sufficient to accommodate 10 women. Now it possesses a stately building, exceedingly practical and tastefully appointed, and large grounds. The women have each a plain but comfortable room, they remain in

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the home for three years, after which time places as servants are procured for those who have proved diligent and reliable. Experienced lady-teachers impart thorough instruction in household work, cooking, sewing, weaving, washing, ironing, etc. The home, which has accommodation for 36 inmates, has a laundry, and washing is undertaken on a very large scale, which constitutes a good source of income. On December 31, 1902, the assets amounted to 265,241 kronor.

To aid women of all classes of society who by needle-work must contribute to their support, the society of *Bikupan* (the Bee-hive) was founded in 1870 in Stockholm, after a French pattern, with a shop for sale of Swedish works of female industrial art. In 1885, this society, which during many years was directed by Mrs. Rosalie Olivecrona, was amalgamated with Sällskapet för arbetsflitens befrämjande (Society for the promotion of domestic industry), that has a similar object. Bikupan aims at providing an opportunity for self-support to women without means by procuring a market for their work, developing their skill by giving them advice, new models, and patterns, and by opening new provinces for them. Orders are received and addresses are given of women engaged in such work. The commission of sale was in the beginning 6 %, later 8 % and amounts since 1884 to 10 %. The sum total of the thirthy years' turn-over comes to close upon one million kronor, of which one sixth have been received for orders. Similar institutions, in the main with Bikupan as a pattern, have been established also in other places both in and out of Sweden. Another society with a similar object is *De Fattigas Vänner* (Friends of the Poor) in Uppsala. The central bureau of the Society provides work for women in need, preferably by supplying material for weaving and spinning. The central bureau purchases the work made and sells everything in a shop carried on for the purpose. The central bureau also employs a work-directrix, who visits the working women, instructs, and advises them concerning their weaving. Work for char-women is also provided.

Quite young, but of importance to the whole country, is *Föreningen för svensk hemslöjd* (Swedish Domestic Industry Association; see p. 905). It was founded in 1889 for the object of promoting home-sloyd at peasant homes, giving out appropriate and artistical designs, and collecting and maintaining old designs and models as well as the kinds of home-sloyd that are about to die out. The society aims besides, by arranging for a profitable sale of the various products of home-sloyd, at developing home-sloyd into a real source of income for the country population. To this end the society has opened an exhibition and shop, where especially textile fabrics of various kinds, wood-work, basket-work, as also metal-work are exposed for sale. The work of the society is divided according to the different Läns, and County Councils as well as the Agricultural Societies have, through loans free of interest, enabled the society to make cash purchases, by which the confidence of the peasants is gained, and the desire for work stimulated. Subventions have been received by the King and the Lars Hierta Memorial Foundation. In 1902, the turnover amounted to about 95,000 kronor, and in 1903 the amount reached was considerably higher. Several prominent artists are members of the committee, the chairman of which is Prince Eugen.

Elevhemmet (Home for students) in Stockholm has for its object the supporting of young women from the poorer classes, for whom a stay in Stockholm is necessary for the prosecution of studies or for advancing themselves in some branch of trade or profession. The home is supported by a society founded in 1896 for this purpose, and offers good board and lodging for the low price of 35 kronor (£ 2) a month in a comfortable home where they receive motherly care.

Stockholms Internationella Lärarinnehem (International home for female teachers) has a similar object, namely to provide a home for female teachers of

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various nationalities as well as for female students, at the low cost of 50—65 kronor (£ $2^3/_4$ à $3^6/_{10}$) a month. It is especially intended to be a refuge for such teachers out of employment or who, owing to ill-health, are in need of rest. This home was opened in 1894. In 1902, among those accommodated at the home may be mentioned 16 of foreign extraction; at the end of the same year the assets amounted to 36,140 kronor. Expenses in connection with this home are defrayed partly by means of annual contributions from those interested in the movement, and partly from the accrued interest on donations received.

Stiftelsen för gamla tjänarinnor (Institution for old women-servants) was established 1883 in Stockholm with a capital of 130,000 kronor, and provided a home for 12 aged servants, while an annual pension of 100 kronor was paid out to 26 servants. This institution now commands its own house, where accommodation is provided for about a hundred aged servants. Food is not provided in the home, but opportunity is given for cooking in the kitchens. In 1900, the annual pensions amounted to 12,321 kronor, and the capital, which has been steadily augmented by donations, amounted at the end of the same year to 630,440 kronor. In Gothenburg there is a smaller home for women-servants and a society which gives pensions to servants unable to prosecute their calling through old age or sickness. The society grants pensions to about 300 persons and its capital amounts to 625,000 kronor.

Stockholms Sjömanshem (Sailors' Home), which stands under the personal patronage of King Oscar II, was opened in 1891 and has since then been enlarged several times, and at present owns two properties holding altogether 93 rooms and 179 beds. This home is intended to be a refuge for Swedish as well as foreign sailors during their stay in Stockholm, and besides has an asylum for aged and invalid Swedish sailors. The English parish in Stockholm supports special reading and writing-rooms for English sailors at the premises of the home. The charge for board and lodging is 1·50—2·25 kronor ($1^2/_3$ to $2^1/_2$ *sh.*) per day; 40—55 kronor (£ 2·2 à 3) per month. For lodging alone, the charge is 50 öre to 1 krona a day (7 à 13 *d.*), or 10—20 kronor a month (11 à 22 *sh.*). During 1902, the home accommodated 5,221 sailors of 22 different nationalities. *Stockholms sjömansmissionsförening* (Sailors' mission society) has a fine building at Värtan harbour outside of Stockholm, where there are reading and writing-rooms, and where tea-evenings, Divine service, and lectures are held. In Gothenburg there is also a Sailors' home, called *Sjömanssällskapets hem*, established in 1837, which in 1900 moved into new premises and is partly intended for captains and sailors. This home has besides for its object the supporting of sailors in need, sailors' widows and children, and boys who are studying seamanship, also helping them to get their first equipment. In Karlskrona, the naval port and arsenal of Sweden, there is a *Skeppsgossehem* (Home for Ship-boys), which provides a refuge for such boys during their leisure hours, and consists of large writing and sitting rooms, as well as a library.

At several places in Sweden asylums and infirmeries have been established for inebriates, of which the principal are *Sans-Souci*, a little to the north of Uppsala, and *Eolshäll*, near Stockholm, the former being opened in 1891, and intended for the working classes; and the latter in 1897, where 75—125 kronor (£ 4—7) a month is charged. As a practical counteraction against drunkenness *automatic machines for warm milk*, invented by Miss Valborg Ulrich, have been adopted. The undertaking, initiated in 1902, consists in erecting such machines at market-places, wharfs, and other places where the working classes congregate, and from them a mug of warm milk can be obtained upon putting 5 öre ($^2/_3$ *d.*) in the slot. There are now 6 warm milk automatic machines in Stockholm, and one at each of the towns of Gothenburg, Karlskrona, Sundsvall, and Örebro. At one of the automatic machines in Stockholm 31,372 mugs of milk were supplied in 1903 in the course of 142 days.

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By private social activity there is certainly much accomplished — especially from religious sources — but only the more characteristic and greater undertakings have been treated here.

A *Central League* for social work was initiated in Stockholm during 1903, the object of which is to arouse interest for and circulate knowledge about social questions within the different classes, for the solution thereby of vital social questions. This league is composed of societies or groups of societies working for social development. It has instituted a social bureau of information in the capital, where matters concerning social questions from various countries are collected and elaborated, and where verbal or written information is given. In connection herewith it is the intention to establish a lending and reference library especially embracing social works. The Central League arranges lectures and discussions on social and communal questions, and provides opportunity for a real social education for persons who wish to devote themselves to social work.

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APPENDIX.

The printing of this work has through casual circumstances extended over a period of two years and a half. In this appendix will be accounted for the more important additions that have thus become necessary.

Page 95. The population of Sweden at the end of 1903 was about 5,220,000.

Page 106. The population of the larger Swedish towns at the end of 1902 was: In Stockholm, 305,819; in Gothenburg, 133,625; in Malmö, 64,653; in Norrköping, 42,033. Inclusive of the suburbs the figures for the end of 1903 were, in round numbers: In Stockholm, nearly 330,000; in Gothenburg, 160,000; in Malmö, 78,000; in Norrköping, above 50,000.

Page 125. According to the tables of mortality for the decade of 1891/1900 the *expectation of life* in Sweden was for a new-born child: male 50·94 years, female 53·63 years; both sexes: 52·30 years.

Page 130. (Table 26). For the whole period of 1851/1900 the total number of emigrants was 584,259 men and 424,566 women, total: 1,008,825. The number of immigrants was 95,732 men and 69,625 women, total: 165,357. Excess of emigrants: 488,527 men, 354,941 women, total 843,468.

Page 148. The proposition of the Government mentioned in the foot-note to this page was rejected by the Riksdag of 1902. In consequence of a request of the same Riksdag, the Government, in 1904, has brought forth a new proposition concerning extension of the franchise. According to this, the number of voters should be increased from about 380,000 to about 950,000, or from 28 % to 70 % of the men of age. The bill demands the introduction of proportionate election, according to a method worked out by a Royal Committee.

Page 156. The consumption of butter (natural) amounts, according to a later calculation (see p. 584), to 7·2 kilogr. per inh., i. e., almost 16 *lbs.*

Page 182. Concerning the Government proposition, in 1904, with regard to extension of franchise, see just above.

Page 208. Since 1903, a new direct and progressive tax has been in force, viz., the *Income-tax* (Inkomstskatten), the regulations concerning which were issued by the Royal Ordinance of June 21, 1902. In combination herewith *general* self-declaration was introduced, i. e., the obligation of giving informations in good faith concerning one's income, real estate, etc. Now, this obligation also devolves upon every one having been assessed the preceding year at an income of at least 2,000 kronor or having possessed at least this income, or else a smaller income, in case at least 1,000 kronor of it were derived from real estate or capital, and, finally, upon everyone summoned by the assessment authorities thereto. Neglect in fulfilling one's declaration duty entails the loss of right to appeal against the

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assessment in question. Intentionally false informations are fined with 4—10 times the amount of tax withdrawn, still at the lowest with 25 kronor. — The following kinds of income are assessed: income from real estate, calculated at a rate of 6 % for landed estate and of 5 % for other real estate; income from capital, i. e., interest on loans given out, bonds, and bank-deposits, and also dividends on shares in Swedish joint-stock companies and Private banks; income from work, pension, or life-annuity. It is to be observed that this assessment differs from that of the Allmänna bevillningen (General supply) in so far that dividends on the shares above mentioned are assessed for income with the shareholders; the companies hence being free from paying income-tax on the dividend to the shareholders, yet not for more than 6 % of the paid-up capital. Further, deduction may be made for interest on loans, and for certain losses in business. — Concerning the progressiveness of the tax, it is to be observed that for income not amounting to 6,000 kronor certain deductions of varying amount are admitted; income below 1,000 kronor is altogether exempt from tax. For greater income, a progression is made, at the most by multiplying the original income by four, this maximum commencing with an income of 145,500 kronor; thus the calculation of the tax in this special case is carried out as if the income were 582,000 kronor. — The tax accrues with 1 % of the amount calculated according to the progression regulations. — The tax in 1903 yielded, in round number, an amount of 10·5 million kronor.

Page 247. Very recently (in 1904) a general Swedish *Association* has been formed for the combating of consumption in Sweden.

Page 268. The number of dioceses is, from 1904 inclusive, 13; but will later on again be reduced to 12.

Page 278. In 1903, the tax on spirits was increased from 50 öre to 65 öre per liter à 50 % alcohol, thus to about 45 *d.* per imp. gallon (or 65 cents per winch. gallon).

Page 284. In 1903, an excise was introduced on malt drinks; for further details, see p. 791.

Page 299. In Stockholm, matters pertaining to common schools are now (in 1904) managed by the town council, as was already previously the case in Gothenburg.

Page 312. A State reformatory school at Bona, in the province of Östergötland, will in a short time be ready to receive pupils.

Page 319. The sentence commencing with the words: »The Apologists Schools established», etc., and closing with the following: »Allmänna läroverket).», ought to read as follows: In 1820, »Apologists Schools» were established by the side of the classical schools to meet the demands for the common citizens' education, and in 1849, the classical and »Apologist» Schools were merged, etc.

Id. On the basis of the Educational Committee report, a Royal proposition concerning the school question has been laid before the Riksdag of 1904. This proposition has in view to make the State colleges for boys hereafter consist only of two kinds: Scientific schools of six classes for the imparting of a civic education beyond that given by the Common schools, and Complete colleges, consisting of a scientific school of six classes and a college covering four years, which is besides intended to impart a fundamental knowledge in science. *The Scientific School* (Realskolan), which is to be founded on the education received at the Common schools, is to be uniformly organized without Latin and is completed in the sixth class with a final examination entitling the students to apply for entrance into a

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great number of services. *The College* (Gymnasiet), which forms a continuation from the fifth class of the Scientific school, consists of two lines, the Scientific and the Latin college, and in the last two years quite an extended free choice of subjects is allowed. In some places, where there is not too great a number of pupils, the Scientific school may be arranged as a *Mixed school* (Samskola) for boys and girls, placed under a special Local Board and employing an equal number of male and female teachers. *The School-year* is extended from 36 to 38 weeks. For supervising the examinations and exercising inspection over the schools, as well as for taking under consideration the more important school questions, a *Chief Board* is to be organized, consisting of one chairman and five other members, and appointed by the Government for a period of five years at a time. In connection herewith the appointment of teachers is placed in the hands of the Government, and the so-called teachers' trials are done away with. An effective amelioration of salaries and pensions is proposed; thus the salary of the adjuncts is to be raised at a maximum of 5,000 kronor and that of the lectors at a maximum of 6,000, in both cases after a service of 20 years. For teachers of singing, drawing, and gymnastics there are to be new stipulations of salaries.

Page 498. (Table 55). The definite result of the Census of 1900 has given the following figures, viz.: Agriculture and fishing, 2,756,704 inh.; Industry, 1,484,230; Trade and transport, 544,324; Public service, etc., 351,183; Total: 5,136,441. Hence, the percentages are 53·67, 28·90, 10·60, and 6·83 % respectively. Consequently, since 1890, Industry has increased a great deal more, and Agriculture decreased more, than one has supposed.

Page 697. At present (in 1904) preparations are being made for the building of Iron works at Karlsvik, near Luleå, intended for the production of iron out of Norrbotten ore, — hitherto solely exported as raw material. These plans are founded on a new method, recently invented by the Swedish Engineer G. Gröndahl.

Page 789. Since October 1, 1903, every substitute for malt is forbidden in the breweries.

Page 1054. The Law of June 28, 1895 has now been substituted by the new legislation of 1903 concerning Insurance; see p. 1040.

Page 1077. Since 1896, the Riksdag has given a yearly grant (1,400,000 kronor) to a *Fund* for the insurance of workmen, the balance of which at present is about 13 million kronor. Regarding the utilization of these means nothing has as yet been decided.

Page 1087. In 1903, by a will of Vilhelm Govenius, a Fund was formed for the erection of smaller dwellings in Stockholm, especially intended for widows and families of many children.

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INDEX.

Abelin, Hj. 463.
Abnormals' Schools. 305—311.
Abrahamson, A. 301, 1098.
Abramson, E. 592.
Abruzzi, Duke of. 378.
Abstinence. 283, 284.
Abyssinia. 301.
Academical Society in Lund. 337, 338.
Academies. 375—378.
Accidents. 1074, 1075, 1076, 1079.
Acetylene. 854.
Acharius, E. 467.
Acreage under crops. 521, 522, 524, 525, 526, 531, 538.
Acrel, Olof af. 458, 463.
Acta Mathematica. 341, 481, 482.
Act of Resumption. 171.
Adams-Ray, E. x.
Addison, Jos. 401.
Adelborg, Gertrud. iv.
—, Maria. 904.
Adelcrantz, K. F. 417.
Adlersparre, Sophie. 275, 904.
Adlerz, G. 472.
Administration. 103, 110, 168, 190, 263.
Admiralty. 191, 204, 225, 226.
Adolphus Frederick. 86.
Adventists. 269.
Africa. 270, 493, 947.
Aftonbladet. 397, 405, 894.
Afzelius, A. A. 432.
—, P. von. 462.
Agardh, J. M. 483.
—, K. A. 319, 453, 457, 467, 468, 469.
Age. 111, 112, 115, 118, 124, 125, 126, 128, 130, 149, 151.
Agrell, Alfhild. 408.
—, J. 432.
—, K. M. 442.
Agricultural Engineers. 589.
— High Schools. 517, 548.
— Implements. 541—544, 867, 880, 902.
— Labourers. 610—615, 1089.
— Meetings. 609.
Agricultural Schools. 593, 594, 595, 596, 597.
— Science. 590—593.
— Shows. 554, 561.
— Societies. 314, 555, 564, 565, 566, 584, 585, 588, 589, 590, 602, 603, 604, 608, 610.
Agriculture. 68, 175, 498, 499, 506, 511, 513.
Ahlborn, Lea. 419.
Ahlström, A. viii.
Ahnfelt, O. 436.
Aktiebolaget * Acetylengasverket Freja. 881.
— Carlsviks Gjuterier. 880.
— Centrator. 880.
— de Lavals Ångturbin. 880.
— Diesels Motorer. 880, 889.
— Excelsior. 880.
— Extractor. 880.
— Mekanikus. 880.
— Moresco. 809.
— Palmcrantz & C:o. 880, 881.
— Primus. 881.
— Radiator. 586, 880.
— Separator. 586, 587, 868, 880, 888.
— Sveaseparatorn. 586.
— Svenska Kapsylfabriken. 881.
— Telefonfabriken. 881.
— Velox. 880.
Ala. 645.
Alaska. 100.
Alauzet. 894.
Albano. 604.
Albert of Mecklenburg. 75.
Alby Carbide Factory. 888.
Alcohol. 150, 154, 156, 277, 278, 283, 284, 785, 786.
Alder. 16, 56, 58.
Aldermen. 195, 196, 230, 253.
Alfvaret. 20.
Alfvén, H. 433.
Alfvesta. 980.
Aldén, G. iv.
Algeria. 693.
Alin, O. 447.
Alingsås. 764, 765.
Allmänna Brandförsäkringsverket. 1045.
— Hagelskadeförsäkringsbolaget. 1049.
— Lifförsäkringsbolaget. 1046.
— Pensionsförsäkringsbolaget. 1046.
— Svenska Elektriska Aktiebolaget. 880.
Allodial Property. 69.
Allotment. 201.
Almanacs. 375.
Almedal. 804.
Almén, A. T. 460, 791.
Almesåkra. 41.
Almgren, K. A. 808.
—, O. v.
Alm Institute. 1098.
Almkvist, H. N. 444.
Almlöf, Betty. 434.
—, K. 434.
—, N. V. 434.
Almonds. 921.
Almquist, E. 457, 461.
—, S. 454.
Almqvist, K. J. L. 404, 405, 406.
—, Sven. 874.
Almsgiving. 258.
Almström, R. 843.
Alnarp. 22, 523, 547, 548, 560, 588, 594, 596, 597, 604, 808.
Alnö. 47, 645.
Alpine Region. 51, 52, 53, 60, 62, 359.
Alpine-schist. 44.
Alsike Clover. 539.
Alströmer, J. 87, 537, 559, 590, 764, 765, 792, 795.
Altappen. 642.
Alum. 42, 43, 44, 754.
Alvastra. 261.
Ambassadors. 186.
Ambrosius, J. M. iv.
Ambulance Societies. 285.
Ambulatory Schools. 289, 294.
Améen, L. v.
America. 91, 123, 128, 130, 132, 133, 157, 269, 271, 283.

* Aktiebolag = Joint-Stock Company.

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307, 354, 356, 358, 541, 543, 544, 547, 563, 586, 679, 692, 698, 792, 814, 839, 856, 868, 894, 947, 964.
America, British. 635.
American Swedes. 132, 270, 283, 333.
Amykos-Aseptine. 861.
Amphibians. 61.
Analphabetists. 137, 153, 167, 299.
Anatomy. 458.
Anchovies. 676.
Ancylus-lake. 50.
Anderberg, A. 414.
Andersén, A. 433.
Anderson, A. 464.
—, Charles. 493.
Andersson, Aug. P. VI.
—, Gunnar. III, X, 469, 495.
—, K. 885, 907.
—, O. 459.
—, Theophil. III, X.
Andesite. 47.
Andrée, S. A. 487, 488, 492, 496.
Angelin, N. P. 471, 473.
Angered-Strandberg, Hilma. 408.
Anglicans. 269.
Animals see Fauna.
Anjala Mutiny. 173.
Anjan Lake. 10.
Anjeskutan. 10.
Anjou, L. A. 436.
Ankarcrona, G. 428.
Ankarsrum. 877, 881.
Annerstedt, Cl. 447.
Anrep-Nordin, Elisabeth. 308.
Ansgarius, St. 70, 261.
Anthropology. 465, 494.
Apatite. 857.
Apiculture. 569.
Apologist Schools. 319.
Appelberg, O. 6, 9, 36, 487.
Appellöf, A. 472.
Apples. 545.
Appointment (of Officials). 196.
Apricots. 545.
Arabia. 467.
Arable Land. 497, 519, 539.
Arboga Mekaniska Verkstad. 880.
Arbogaån. 954.
Arborelius, O. 427.
Arboriculture. 547.
Arbrå Mekaniska Verkstad. 890.
Archæan System. 36, 37, 38, 39, 40.
Archbishop. 170, 261, 263, 270.
Archeology. 448, 449.
Archery. 368.
Archipelago. 16, 18, 19, 51, 165, 362, 364, 674, 952.
Architecture. 164, 165, 409—415.
Archives. 197, 382.
Arctic Circle, The. 23, 24, 365, 546, 988.
— Expeditions. 469, 471, 474, 487, 490, 491.
— Fox. 61, 62.
Area. 1, 2, 3, 93, 95, 103, 497, 521, 522, 537, 538, 544, 619, 620, 622.
Arehn, G. 880.
Arenius, O. 423.
Areschoug, F. W. C. 469.
—, J. E. 468.
Arfvedson, J. A. 479.
Argentine. 301, 494.
Argillander, A. 305.
Arians. 68, 69, 91.
Arlberg, F. 433.
Arlöf. 985.
Arms, Royal. 168.
Armature Factory. 873.
Army. 177, 210—221, 239.
— General Staff. 201, 202, 203, 217, 367, 483, 989.
— High School. 217.
Arnberg, V. 455.
Arnoldson, A. 433.
—, Sigrid. 433.
Arosenius, E. III, VII, X, 286.
Arrack. 786, 929.
Arrhenius, Joh. 592.
—, Sv. 476, 477, 480, 488, 887.
Art. 409.
Artedi, P. 470.
Art Hall (at the Stockholm Exhibition). 413, 414.
Artichokes. 546.
Artificial Silk. 807, 808.
Artillery. 216, 217, 218, 219, 220, 225, 226.
— College. 217.
— Museum. 383.
Artisans. 900.
Artists' House. 415.
Arvika. 885.
Arvika Verkstäder. 880.
Ash. 17, 56, 57.
Asia, 493, 947.
— Minor. 467.
Ask, K. J. 464.
Askersund. 24.
Asksta. 645.
Asparagus. 546.
Aspen. 16, 53, 56, 57, 825.
Asphalt. 815, 839, 853, 991.
Assassination. 153.
Assault. 153.
Assay Office. 194, 885, 1023, 1024, 1061.
Assets, of the State, 210. — of the Communities. 253.
Association for Children's Workshops. 274.
Association Registers. 1056.
Astronomy. 482—484.
Assurans (Periodical). 1049.
Asylums, Inebriates'. 1105.
— Lunatic. 239, 240, 241.
Atterberg, Alb. 593.
Atterbom, P. D. A. 403, 438, 450, 452.
Athletics. 372.
Atlas Works. 871, 879, 880.
Attorney General. 193, 196.
Auburn-system. 233.
Audit Court. 194, 196, 208, 231.
Auditors. 177, 194, 196.
Augsburg Confession. 262, 267.
Augustana College. 333.
— Synod. 270.
Aulin, T. 433.
Aurivillius, C. 442.
—, Chr. 471, 486.
—, K. V. S. 472.
Australia. 123, 661, 796, 947.
Austria. 123, 137, 147, 150, 154, 301, 321, 356, 374, 529, 577, 586, 638, 692, 693, 694, 715, 750, 868, 930, 977.
Avastrõm. 646.
Avén, J. A. 1015.
Avesta. 646, 743, 756, 856, 887.
Axell, S. 470.

Bachmanson see Nordencrantz.
Backlund, J. O. 484.
Bacteriology. 461.
Baden. 465.
Badger. 65.
Bæckstrõm, O. 435.
Bagge, Jakob. 81.
—, J. S. 822, 823.
Bailiffs. 191, 195.
Bailiwicks. 195.
Bakeries. 793, 900.
Balck, V. v.
Balder. 1046.
Balks. 652.
Balkan States. 154.
Ballads. 74, 399, 430, 432.
Baltic, The. 1, 17, 21, 30, 32, 33, 48, 58, 59, 66, 67, 68, 70, 81, 82, 83, 85, 106, 165, 168, 204, 362, 674, 675, 676, 677, 944, 947, 954, 956, 957, 959.
— Provinces. 138, 553.
Band, Military. 219.
Banér, Johan. 85.
Bank of Sweden. 177, 194, 207, 209, 598, 831, 1022, 1024, 1027, 1028, 1029.
— of Sweden Palace. 412, 415.
Banking. 1024.
— Companies. 1029, 1030, 1054.
Banknotes. 1024, 1025, 1026, 1027, 1028, 1032.

Digitized by Google

Baptists. 269, 271.
Barber Surgeons. 243.
Bar Iron. 707, 708, 725, 926, 929.
Bark & Warburg. 646, 828.
Barley. 155, 522, 524, 525, 527, 528, 529, 531, 532, 533, 535, 536, 551, 789.
Barnekow, S. 587.
Barnängen. 801.
Barracks. 218. 220, 415.
Bar Steel. 725.
Bar-trade. 278, 279, 281.
Basket-work. 833, 902.
Bassalt. 46.
Bat. 62, 65.
Bathing. 245, 246.
Batrachians. 62, 66.
Battens. 641, 658, 661, 664, 665, 666, 928.
Battleships. 224.
Bavaria. 150, 789.
Beams. 658, 661, 663, 664, 665.
Beans. 524, 546, 551.
Bears. 62, 64, 670, 671.
Beasts of Prey. 671.
Beaver. 66.
Bechtolsheim, von. 577.
Beck, Dav. 422.
Beckholmen. 960.
Beckman, Ernst. 1080.
Beck & Son. 907.
Beech. 21, 51, 52, 58.
Beehive, The (Society). 1104.
Beer. 154, 156, 284, 367, 788, 789, 790, 791.
Bees. 569.
Beet Sugar. 207, 770, 779, 780, 781, 783.
Begging. 255.
Beijer's Skofabrik. 812.
Bell, D. O. x.
Belgium. 1,3, 123,124,125, 137, 147, 154, 283, 301, 487, 529, 531, 661, 664, 693, 697, 715, 750, 758, 796, 822, 826, 848, 924, 925, 927, 929, 930, 947, 948, 949, 970, 977, 979, 982, 1034.
Bellite. 860.
Bellman, K. M. 87, 401, 432.
Belts, The. 50, 68, 69, 85.
Bendixsson, L. 482.
Bendz, H. 461.
Benedictsson, Victoria. 407.
Benevolence. 253, 1097.
Bengtsfors. 856.
Bengtsson, S. 472.
Benzelius, E. Jun. 378, 436, 456.
Beowulf. 399.
Berch, A. 454.
— K. R. 448.
Berencreutz, A. VIII, IX, X.
Berg. 958.
Berg, Erik Anton. 881.
—, Fridtjuv. x, 454.
Berg, Fr. J. 885.
—, Fr. T. 457, 463.
—, J. VI, 464.
—, R. F. 837.
Bergelin, J. Th. 592.
Bergendal, D. 472.
Berger, A. 481.
Bergfalk, P. E. 438.
Berggren, J. 442.
—, S. 468, 469.
Bergh, Axel. 790.
—, E. 425.
—, R. 429.
Bergholmen. 646.
Bergian Institute. 376, 547, 548, 1098.
Berglund, E. 480.
Bergman, C. G. IV.
—, G. 457.
—, I. O. 87, 473, 477.
Bergman-Österberg, Mrs. 354.
Bergs Bolag. 801.
Bergsbro. 798.
Bergsjö. 645.
Bergstrand, C. E. 592.
Bergström, A. 428.
Bergström, G. 435.
Bergsund Mechanical Works 224, 869, 871, 879.
Bergvik. 645.
Berlin. 24, 680, 948, 1020.
Berlin, N. J. 461, 470.
Bernadotte Line. 89, 168, 174.
Bernström, J. 868.
Beronius. 880.
Berries. 53, 54, 55, 56, 58, 788.
Berrigan. 577.
Bersbo. 40, 754.
Berwald, F. 432, 433.
Berzelius, J. J. 277, 319, 460, 476, 478, 479, 480, 513, 591, 807, 816, 823.
Beskow, B. 907.
Beskow School. 329.
Bessemer, H. 732, 733, 734, 735.
Bessemer Converters. 738, 739, 740.
Bessemer Furnaces. 732, 733, 734.
Bethany College. 333.
Biberg, N. F. 439.
Bible Commission. 267.
—, Translation of. 92, 262, 435.
Bibliography. 398.
Bibliotheca Mathematica. 482.
Bicycling. 372.
Bie. 245.
Bilberg, J. 438, 488.
Billesholm. 22, 841.
Billing, G. 436.
Billingen, 16, 42, 43.
Bills (of Parliament). 177, 183, 184.
Biological Museum. 386, 387.
Birch. 12, 16, 51, 52, 53, 54 55, 57, 60, 64, 667.
Birds, v. Fauna.
Birger Jarl. 74, 75, 76.
Birka. 70.
Births. 95, 96, 98, 100, 113, 114, 115, 120, 122, 129, 130.
Biscuits Factories. 793.
Bishops. 263, 265, 286, 320.
Bispberg. 687, 691.
Bispgården. 365.
Bivalves. 43.
Björklund, Hedwig. x.
Bjerknes, V. 486.
Bjuf. 22, 45, 841.
Björck, A. x.
—, O. 429.
Björkborn. 877.
Björkholm. 34.
Björklund, G. 285, 455.
Björkman, E. 444.
Björlin, G. 447.
Björling, C. F. E. 481.
—, E. G. 481.
—, J. 492.
—, S. VIII.
Björneborg (in Vermland). 721, 735.
Björnsholmen. 642.
Björnståhl, J. J. 442.
Black Cock. 65, 670, 672.
— Plague. 76.
Bladh, P. J. 590.
Bladin, J. A. 480.
Blanche, A. 405.
Blankaholm. 646.
Blast Furnaces. 713, 714, 716, 717, 718, 719, 720, 721, 722, 768, 770.
Blekinge. 3, 4, 20, 33, 39, 58, 71, 74, 75, 83, 92, 94, 98, 114, 135, 147, 154, 230, 232, 392, 521, 524, 526, 528, 531, 538, 575, 613, 624, 641, 675, 677, 770, 777, 779, 784, 836, 881, 954.
Bleking Punt. 953, 954.
Blencke, A. x.
Blind. 305.
Blind Deaf-mutes. 308, 309.
Blind-Schools. 309, 310.
Blind-worm. 62.
Blister Steel. 707, 750.
Blix, M. G. 460.
Blomberg, 555.
Blommér, N. J. 424.
Blomquist, K. IV.
Blomstrand, K. V. 479.
Bloom-Hammer. 730.
Blooms. 707, 730.
Blotsven. 72.
Blue Ribbon-men. 283.
Bluffs. 15.
Blötberget. 704.
Board of Agriculture. 194, 565, 579, 585, 589, 590, 603, 604, 680.

Digitized by Google

Board of Finances. 253.
— of Guardians. 252, 254, 258.
— of Health. 243, 244, 245.
— of Mines. 761.
— of Railway Directors. 985, 986.
— of Trade. 194, 245, 457, 705, 761, 774, 916, 917, 940, 1081.
Boards. 641, 658, 661, 663, 664, 665.
Boat-building. 371.
Bobbins. 867.
Boberg, Anna. 904.
—, F. 414, 430.
Boden. 221, 980.
Bodö. 366.
Boëthius, D. 438.
—, E. 790.
—, S. J. 447.
Bofors Iron Works. 708, 744, 876, 877, 878, 881.
Bog Ores. 688.
Bogie-carriages. 984.
Bogs. 54.
Boheman, K. H. 471.
Bohemia. 789.
Bohlin, K. VI, 484.
Bohuslän. 3, 4, 18, 19, 39, 56, 57, 64, 74, 83, 135, 675—677, 680, 836, 953, 980.
Boije af Gennäs, S. 338.
Boklund, J. 425.
Bolinder, C. G. 871.
—, Jean. 871.
— Works. 866, 871, 880, 1085.
Bollsta. 643.
Bomhus. 645, 960.
Bona. 1108.
Bondeson, A. 408.
Bondesson, P. 568.
Bonds. 210, 600.
Bone. 920, 922.
Bone-dust. 857.
Bonnier, Eva. 429.
Bonthron, Alice. IV.
Bookbinding. 832, 906, 907.
Book-trade. 940.
Bopp, Fr. 442.
Bore. 1048.
Borelius, J. 464.
—, J. J. 438.
Borg, C. O. 798.
—, P. A. 305, 309.
Borgholm. 245, 364, 412.
Borlänge. 888.
Boroughs. 103.
Borås. 34, 106, 108, 346, 604, 772, 795, 798, 801.
Bosarp. 45.
Bosse, Harriet. 435.
Boston. 354, 974.
Boström, K. J. 438, 439, 440.
Botanical Gardens. 339, 391, 548.
Botany. 465—470.
Bothnia, Gulf of. 1, 33, 34, 58, 64, 67, 69, 102, 674, 676, 944, 995.
Botvid. 74.
Bouchardon, J. P. 417.
Bourdon, S. 422.
Boundaries. 1, 2, 74, 76, 79, 81, 83, 85, 88, 89.
Bourgelat, C. 598.
Boussingault, J. Bapt. J. D. 592.
Bowallius, B. 387.
Boxholm. 646.
Boy, W. 416.
Boyesen, J. X.
Boyle, R. 476.
Brachycephals. 134, 135, 166, 465.
Brage. 1046, 1049.
Brahe, Per. 142, 590.
—, Tycho. 34, 484.
Braille Type. 309.
Brambeck, E. 420.
Bran. 777.
Brandelius, G. 426.
Brandt, G. 477.
—, T. 354, 356.
Branting, Agnes. 904.
—, Gabriel. 350.
Brask, Henrik. 956.
Brass. 757, 875, 877.
Brate, E. 443.
Brattfors. 887, 888, 890.
Brauner, J. 543, 544.
Brazil. 301.
Bread. 155.
Breadth. 2.
Bream. 678.
Breda, K. F. von. 424.
Bredman, A. 483.
Bredsjö. 704.
Breitenfeld. 82.
Bremen. 83, 792.
Bremer, Fredrika. 275, 406.
—, E. 448.
Bremerhafen. 974.
Breweries. 770, 788—791, 1068.
Bricks. 46, 839, 841, 842, 880, 991, 1068.
Bridget, St. 76, 261, 399, 435, 892, 904.
—, St. Order of. 76.
Brigitta see Bridget.
Brinell, J. A. 908.
Bring, J. C. 270.
Brodda. 555.
Brodén, T. 481.
Broen, A. de. 434.
Brogården. 597, 598.
Brokers. 916.
Broling. 862.
Broman, J. 458.
Bromell, M. von. 472.
Bronze. 69, 1021, 1022.
Broocman, K. U. 453.
Browallius, J. 453.
Brunius, K. G. 450.
Brunkeberg. 18, 78, 994.
Brunsson, J. 795.
Bruzelius, N. G. 465.
—, R. 462.
Brynäs. 960.
Bräcke. 980.
Bränfors. 642.
Brännudden. 880.
Brömsebro. 83.
Buck-wheat. 524.
Budget. 177, 183, 205.
Buenos Ayres. 796.
Builders. 900.
Bulgaria. 301.
Bulletin de l'Institut International de Statistique. 507.
Bullion and Specie. 508, 509.
Bulls. 551, 563, 564, 565.
Burbot. 678.
Bureus, A. 488, 494.
—, J. 441.
Burghers. 86, 142, 171.
Burial Funds. 1091—1093.
Burman, E. 485.
—, E. O. 440.
Burström, H. VIII, IX, X.
Business Associations. 1052—1055.
Butter. 156, 514, 516, 562, 563, 571, 572, 573, 574, 575, 578, 579, 582, 583, 584, 585, 924, 926, 928.
Butterflies. 61.
Buttermilk. 580.
Butyrometer. 582, 583.
Buzzard. 64.
Bydalen. 364.
Byelfven. 666.
Byn. 644.
Byron, G. N. G. 405, 406.
Byström, J. N. 418.
—, H. 203.
Båtskärsnäs. 642.
Bååth, A. U. 408.
Bäck, Abraham. 458.
Bäcklund, A. V. 476, 481.
Bäckström, H. 474.
Böhlmark, Arvid. 881.
Börjeson, J. 419.
Böttiger, J. 451.
—, K. V. 404.

Cabbage. 546.
Cabinet. 175, 176, 183, 186, 188, 192, 193.
Cabo Corso. 489.
Cadastre. 201.
Calcium Carbide. 854.
Calefactors. 882.
Calendered Fabrics. 793, 809.
Calonius, M. 437.
Calves. 550, 551, 580.
Cambrian System. 36, 37, 42, 43, 44, 45.

Digitized by Google

Canada. 301, 638, 890.
Canals. 508, 954—959.
Candles. 817, 818.
Canells Manufakturverk. 881.
Cannons. 220.
Canoeing. 362, 372.
Cape Colony. 301, 542, 661, 664, 796.
Capercailzie. 64.
Capitation Tax. 207.
Capsules. 881.
Carbolic Acid. 815.
Carbolineum. 815.
Carbonic Acid. 861.
Carlander, O. I. 311.
Carlgren, O. 472.
Carlheim-Gyllenskiöld, V. 477, 487.
Carlson, A. 419.
—, Ernst. I, IV, V, 447, 454.
—, F. F. 288, 447, 453.
—, O. 856.
Carlsund, O. E. 862.
Carlsvik Foundry Co, Ltd. 880.
Caroline Institute. 237, 242, 333, 335, 336, 338, 339, 340, 356, 379, 382, 393, 458, 460, 461, 463.
Carp. 679.
Carpentry. 828, 924.
Carriages. 868, 902, 921.
Carriera, R. 423.
Carrots. 537, 538.
Casparsson & Schmidt. 808.
Caspersson, C. A. 737, 738, 743.
Caspersson's Converters. 744.
Cassel, G. 455.
—, G. 809.
Casselli, Hilda. IV.
Castings. 707, 867.
Castles. 161, 162, 364.
Catechism. 267.
Cathedrals. 267.
Catholic Apostolic Church. 269.
Catholicism. 72, 80, 141, 171, 262, 399.
Cattle. 514, 549, 551, 557—566, 928.
Cauliflower. 546.
Causes of death. 126, 246.
Caustic Potash. 752.
— Soda. 856.
Cavalry. 214, 216, 217, 219, 220.
Cawallin, Kr. 444.
Cedergren, H. T. 1016, 1020.
— Telephone Co., Ltd. 1020.
Cederschiöld, J. G. Ch. 443.
—, P. G. 464.
Cederström, G. O. 86, 427.
Cell System. 233—235.
Cellulose. 822.
Celsius, A. 87, 472, 475, 482, 483, 485.
Celsius, M. 441.
—, O. 442.
Cement. 753, 836, 837, 839.
Cement-copper. 755.
Census. 146, 198—200.
Central America. 495.
Central Board of Industry and Craft. 901.
— Boards. 193, 194, 196, 197.
— Bureau of Statistics. 194. 197, 198, 199, 383, 393, 457, 603.
— Gymnastic Institute. 217, 274, 348, 349, 351—354, 393.
— League for Social Work. 1106.
— Meteorological Office. 485, 486.
— Organization of Industry and Craft. 901.
— Printing-office. 894, 895.
— Public Surveyors' Office. 201.
— Telegraph Station. 1008.
Centrator Co, Ltd. 880.
Cereals. 514, 515, 518, 521, 522, 524—528, 537, 549—551, 562, 919, 920, 927, 928, 931, 991.
Cervin, Carl. 1103.
Chalk. 46, 845.
Chalmers' Polytechnical College. 343, 345, 346.
—, William. 345.
Chancery. 191, 192.
Chappe, C. 1006.
Chapters. 263, 264, 286, 320, 327.
Charcoal. 667, 709—712, 768, 833, 853, 1068.
Chardonnet, H. 808.
Charity. 236, 257, 298, 310.
— Organization Society. 258, 274, 275.
Charles IX. 80, 82, 262, 763, 897, 911, 954.
Charles X Gustavus. 82, 85, 212, 764.
Charles XI. 82—85, 142, 143, 171, 192, 212, 222, 237, 262, 477, 488, 553, 763, 764, 898, 912, 961.
Charles XII. 80—82, 85, 86, 171, 172, 192, 212, 222, 262, 267, 489, 898, 912, 941, 956, 1001.
Charles XIII. 89, 185.
Charles XIV John. 89, 174, 185, 412, 913.
Charles XV. 89, 425, 554.
Charleville. 720.
Charlier, C. V. L. 484.
Charlottenberg. 934.
Charr. 678.
Charts. 204.
Chauveau, R. 416.
Cheap Home Company, Ltd. 1086.
Cheese. 562, 571—575, 579, 580, 584, 585, 778.
Chemical Industry. 768, 855—861.
Chemistry. 460, 477—480, 603, 604.
Chemnitz, B. P. von. 445.
Cherries. 545, 788.
Chesnecopherus, J. 458, 465.
Chicago. 271, 457, 1020.
Children, Protection of. 1099. 1100.
Children's Homes. 1100.
Chili. 301, 904.
China. 270.
Chinaware. 842, 843, 844, 848, 905. Cf. Pottery-works.
Chip-boxes. 829.
Chlorate. 856.
Chocolate. 775, 783.
Cholera. 244, 245.
Christian II. 77.
Christian IV. 411.
Christian Frederick, Prince. 185.
Christian Student's Movement. 270.
Christianity, Introduction of. 70, 71, 72, 141, 170, 261, 262, 399, 409.
Christina, Queen. 82, 86, 143, 422, 431, 898, 1001.
Christmas. 158.
Church. 74, 77, 84, 142, 171, 193, 253, 260, 266, 267, 286.
Churns. 576, 578.
Chydenius, A. 454.
Cigars. 792.
Cities, see Towns.
Civil condition. 115, 119, 149.
— Law. 177.
— List. 187, 205, 206.
— Servants. 178, 190, 192, 193, 206.
Claëson, K. 440.
Claesson, Aris. 416.
Claestorp. 39.
Clara Candle-factory. 818.
Clason, E. 458, 465.
—, I. G. 414.
Classes, Social. 143, 144, 154.
Clay. 45, 46, 47, 48, 768, 833.
Clay-slate. 40, 41, 42, 43, 46, 48.
Clearing. 916, 1029.
Clergy. 86, 142, 171, 198, 200, 251, 263—266, 287.
Cleve, P. T. 480, 486, 495.
Climate. 23.
Clinker clays. 682.
Clocks. 868, 881, 886.
Cloetta Brothers. 783.
Cloth. 770, 796, 798, 799, 808.
Clothing. 768, 793, 794.
Club House. 339.

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Coal. 45, 46, 500, 682, 685, 702, 703, 709, 713, 753, 922, 926, 945, 946, 984, 991.
Coal-mines. 702—704, 706.
Coal-tar. 667, 853.
Coast Defense Vessel. 223, 224.
— Guard Service. 934.
Coast-steamers. 952.
Cobalt. 682, 758.
Cocoa. 763.
Code of Laws (of 1734). 92, 228, 229, 437.
Cod-fish. 67, 676, 677.
Coffee. 154—156, 367, 921, 926, 928, 929, 931.
— Substitutes. 783.
Cognac. 786, 921, 929.
Cohrs, E. 203.
Coingts. 720.
Coins. 920, 923, 927, 1021, 1022.
Coke. 685, 709, 713, 753, 926, 991.
Colleges. 144, 273, 286, 317—320, 322—324, 327—329, 331, 1108.
Collodium. 808.
Colomb, Michel. 416.
Colonial Products. 920, 921, 927, 928.
Columbus, S. 441.
Comenius, A. 86, 319, 453.
Commerce. 193, 500, 501, 910. Cf. Exports and Imports.
Commercial Education. 936—939.
— Legislation. 637, 939, 940.
— Navy. 943, 944.
Commission for Tables. 457.
Common Schools. 251, 286—300, 396, 548, 1108.
Communal Assemblies. 251, 259.
Communications. 193, 508, 509, 976.
Communities. 100, 101, 103, 248—251, 253.
Compound Steam-engine. 870.
Configuration. 5.
Conglomerate. 40—42, 45.
Congo State. 493.
Conifers. 54, 60, 620.
Conradsen, H. 419.
Conscripts. 214, 215, 216, 219, 220, 227, 228, 299.
Conservatory. 273, 378.
Constables. 195.
Constituencies. 180—182.
Constitution. 86, 89, 168, 169, 192.
Constitution Acts. 171—175, 178, 191.
Consulate Fees. 952.
Consuls. 186, 187, 916, 970, 973.
Consumption (Phtisis). 247, 248.
Consumption of Beer. 154. 156, 284.
— of Butter. 584, 778, 1107.
— of Cereals. 522, 525, 526, 535.
— of Charcoal. 723.
— of Cheese. 584.
— of Coal. 767, 768.
— of Coffee. 154, 156.
— of Coke. 767.
— of Hops. 789.
— of Malt. 791.
— of Manures. 516.
— of Margarine. 584, 778.
— of Pig Iron. 715, 717.
— of Potatoes. 154, 156, 537.
— of Rye. 154, 156.
— of Spirits. 154, 156, 277, 283, 284, 786.
— of Sugar. 154, 156, 782.
— of Tea. 154, 156.
— of Tobacco. 154, 156.
— of Wheat. 154, 156.
— of Wine. 154, 156, 284.
— of Wood. 620, 621.
— of Wool. 799.
— of Wrought Iron. 726.
Convocation. 263, 270.
Cookery-schools. 382, 1101.
Cook, James. 489.
Co-operation. 1081—1089.
Cooperies. 828.
Copenhagen. 35, 311, 364, 418, 419, 423, 578, 583, 676, 890, 914, 948, 974.
Copper. 40, 682, 685, 753—757, 926.
Cork. 790, 833.
Cornelius, C. A. 436.
Cortona, Pietro da. 422.
Cottages. 160, 611.
Cotton. 800—804, 921, 926, 928.
Cotton-wool. 809.
Council. 84, 170—174, 188, 190, 192.
Country. 110, 125, 126, 154, 160, 180, 181, 182, 195, 229, 239, 248—252, 254, 259, 279, 281.
— Dances. 375.
— Roads. 995—999.
County Councils. 179, 215, 240, 259, 260, 306, 314, 555, 603, 604.
Court of Impeachment. 178, 179, 231, 232.
Courts of Appeal. 230—233.
Courts of Justice. 195, 228, 229.
Cows. 550, 551, 557, 558, 560—563, 565, 571.
Craftsmen. 614, 615.
Crane. 64.
Cray-fish. 66.
Cream. 573, 574, 577, 578.
Creosote. 853.
Cretraceous System, The. 21, 36, 37, 44, 46.
Creutz, G. F. 87, 401.
Criminal Minors. 312.
Criminality. 150—153.
Crofters. 520, 610, 611, 614, 615.
Cronhielm, G. 437.
Cronstedt, A. F. 473, 477, 542, 543.
Cronstrand, S. A. 483.
Crops. 502, 526—529, 531, 536—539.
Crown Land. 143, 177, 206, 207, 618, 621, 624, 625.
— Lands' Office. 194, 618, 628.
Crows. 62, 66, 671.
Crustacea. 67.
Cuckoo. 62.
Cultivated Land. 36, 498, 520, 521.
Cultivation Loan Funds. 601.
Curling. 375.
Curman, C. 463.
Currants. 546, 788.
Curtain Factories. 801, 809.
Custom Legislation. 932.
— Staff. 933, 934.
Customs. 193, 194, 197, 207, 208, 929—934.
— Duty. 783.

Dagen. 397.
Dagens Nyheter. 397.
Dagny. 275.
Dahl, A. 414.
—, S. 905.
Dahlberg, E. 85, 422, 445.
Dahlgren, E. W. 494.
—, F. A. 408.
—, G. 885.
—, J. A. 133, 908.
Dahlgrens (C. W.) Fabriksaktiebolag. 881.
Dahlqvist, G. 434.
Dahlstedt. 59.
Dairies. 571—580, 770.
Dairy-farming. 514, 568, 571.
Dairy-Schools. 588.
Dairy-work Implements. 574, 577—583, 586, 867, 880.
Dal (Saw-mill). 643.
Dalarne. 3, 4, 5, 7, 10, 14, 16, 27, 38—43, 59, 78, 92, 102, 135, 153—155, 160, 253, 364, 365, 368, 392, 410, 539, 567, 621, 629, 631, 645, 646, 652, 717, 836, 902, 980, 995.
Dalarnes Försäkringsförening. 1048.
Dalecarlia v. Dalarne.
Dalelfven. 6, 54, 363, 545, 657, 677.
Dalin, A. v.

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Dalin, O. von. 87, 92, 401, 446, 449, 452, 1043.
Dalkarlsberg. 691.
Dalkvist, O. 1066.
Dalman, J. V. 470, 473.
Dalsland. 3, 4, 5, 39, 41, 135, 637, 646.
Dalsland Canal. 956, 957.
Dalton, J. 478.
Danger from Work. 1070, 1071.
Danielson, Ernst. 890.
Danielsson, O. A. 444.
Dannemora. 93, 685, 690, 691, 700, 702, 723, 727, 732, 751, 752, 764.
Dante Allighieri. 444.
Dartford Heath. 354.
Darwin, Ch. Rob. 469.
Daug, H. T. 481.
David. 74.
David Carnegie's Fund. 236, 1098.
Davidson, D. 455.
Day-labourers. 610, 612, 614.
Day-nurseries. 1099.
Deaconesses. 243, 270.
Deaf and Dumb. 305—309.
Deals. 641, 658, 661, 663 -- 665, 928.
Deaths. 92, 95, 96, 98, 99, 100, 113, 114, 115, 123—126, 128, 129, 147, 149, 150, 153, 243, 1079.
Deer. 65, 671.
Degeberg. 591, 594.
De Geer, G. 15, 474, 491, 492. 495.
—, K. 470.
—, Louis (senior). 763, 764, 766.
—, Louis (junior). 176.
Deland, F. 434.
—, L. 434.
Delary. 821.
Delaware. 138, 489.
Delimitation. 201, 621.
Dellwik, C. A. 853.
Demography. 91, 456.
Denmark. 68—71, 74—79, 81, 83, 89, 91, 123—125, 130, 137, 142, 143, 147, 149, 154, 171, 185, 222, 232, 283, 299, 301, 312, 313, 321, 354, 374, 381, 389, 411, 484, 487, 511, 529, 531, 535, 551, 557, 559. 563, 567, 569, 577, 579, 586, 587, 604, 661—664, 679, 783, 787, 790, 796, 812, 814, 816, 822, 826, 828, 837, 839, 842, 843, 868, 913, 924, 925, 926—928, 930, 935, 945—949, 967, 968, 970, 977—979, 1002, 1022, 1045.
Density of Population. 100—103.
Dental Institution. 339.
Dentists. 242.
Departments of State. 175, 191—194.
Descartes, R. 85.
Designs. 1059, 1060.
Des Marées, G. 422.
Desprez, L. 424.
Diabase. 11, 39, 42, 43.
Dialects. 91, 92.
Diamond-drilling. 700.
Dickson (Family). 395, 645.
—, Beatrice. 1102.
—, Oscar. 493.
Diet see Riksdag.
Dielsel's Motor Co, Ltd. 880. 889.
Dillner, G. 481.
Dining-cars. 984, 985.
Diorite. 11, 36, 39.
Dioceses. 263, 1108.
Diphtheria. 244.
Diplomatic Affairs. 186, 188.
Dissenters. 267, 269.
Distillation of Spirits. 277, 278, 282.
District-court. 229, 230, 233.
Diving Work. 964—966.
Division, Administrative. 94.
—, Historical. 3, 4.
Divorce. 147.
Djurberg, Daniel. 495.
Djursholm. 165, 371, 372, 888.
Docks. 960.
Dolichocephals. 134, 465.
Domestic Economy. 295, 297.
-- Industry. 896, 901.
— Handicraft. 803.
Domnarfvet. 645, 708, 713, 715, 721, 735, 744, 748, 756, 757, 857, 875, 887, 888.
Domsjö. 643.
Doomsday-Book. 201.
Dormsjö. 732—734.
Dorpat. 333, 484.
Drag. 798, 799.
Drainage. 244, 616.
Dramatic Art. 433—435.
Dreher, A. 788.
Dress. 153.
Dressmakers' Societies. 1103.
Drift-sandfields. 58.
Drinkables. 923.
Drontheim. 364.
Drottningholm Palace. 88, 412, 416, 417, 422, 1006.
Drugs. 243, 461.
Drunkenness. 151, 153.
Dryden, J. 401.
Ducks. 62, 64, 65, 568, 670.
Dufbo. 1090.
D'Uncker, K. 425.
Dundret, Mt. 360.
Dunér, N. C. 484.
Dung-forks. 544.
Dutch Balks. 642, 662.
Duty on Spirits. 282.
Dutchmen. 411.
Düben, von (Family). 431.
Düben, G. von. 449, 459, 465
Düsseldorf. 425, 427.
Dwarf-birch. 53, 54, 56.
Dwarf-willow. 53.
Dwellings. 159—165.
Dybeck, R. 449.
Dyes. 861.
Dye-works. 809.
Dynamite. 859.

Eagle-owl. 64, 67.
Eagles. 64, 671.
Earthenware. 839—842, 926.
East India Company, Swedish. 912, 941.
East Prussia. 554.
Eastern Europe. 154, 522, 525, 529, 551.
Ecclesiastical Courts. 231.
— History. 436.
Economic Map Office. 202.
Eda (Glass-works). 845, 847.
Eddas. 399.
Edelcrantz, A. N. 766, 1006.
Edelfelt, A. 405.
Edfeldt, H. 439, 440.
Edge-tools. 881.
Edgren, J. G. 463.
Edlund, E. 476, 485, 486.
Edsken. 733, 734, 735.
Education. 137, 144, 193, 286.
Eel. 674, 677, 678.
Eggs. 569, 929.
Eggertz, C. G. 593.
—, V. 479, 755.
Egypt. 301, 467, 663, 664.
Ehrenheim, F. V. 486.
Ehrenstrahl, D. K. 422.
Ehrenstråle, see Nehrman, D.
Ehrensvärd, K. A. 438, 452.
Eichhorn, Kr. 451.
Eider Duck. 66, 670.
Eidsvold. 185.
Eisen, G. 472.
Ekbacken. 20.
Ekeberg. 39.
Ekeberg, A. G. 479.
Ekenstam, C. Th. af. VII.
Ekerön. 41.
Ekholm, N. III, VI, 486, 487, 488.
Eklund, E. 453.
—, J. A. V.
—, P. 436.
Ekman, C. D. 821, 908.
—, E. J. 269.
—, F. L. 479, 486, 495.
—, G. 486, 908.
—, G. 728, 731.
—, J. A. 436.
—, V. 486.
Ekman's New Carpentry Joint-stock Co. 828.
Ekstrand, C. R. VII.
—, A. G. VII, 480.

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Ekströmer, K. J. 464.
Elberfeld System. 256.
Elbfas, J. H. 422.
Elections (parliamentary). 179, 180, 182, 183.
Electric Industry. 886—892.
— Light. 888—890.
— Machines. 867.
— Motors. 880.
— Telegraph. 1006
Electricity Works of Stockholm. 890, 891.
Electro-Steel. 752.
Elevation. 8, 9, 11, 16, 17, 20, 23, 24, 28.
Elevators. 994.
Elfdalen. 253, 836, 980.
Elfkarleby. 363, 677, 678.
Elfkarleö. 646.
Elfsborg Län. 33, 94, 98, 114, 148, 152, 204, 281, 311, 521, 524, 526, 528, 531, 575, 602, 641, 770, 795, 801, 803, 809, 822, 831, 847, 902, 934.
Elfstrand, D. 734.
—, M. 461.
Eliasson, O. 435.
Eligibility. 180.
Elitoral Region. 59.
Elk. 63, 64, 66, 373, 670, 671, 672, 673.
Elkan, Sophie. 408.
Elm. 56, 57.
Elmblad, J. 433.
Elmlund, A. V. J. 434.
Elmquist, H. 457.
Elvius, P. 456.
Emigration. 92, 95—98, 111—115, 117, 119, 128—133, 151, 157, 502, 1107.
Emin Pascha. 378.
Emmaljunga. 851.
Employers Central Association. 901, 1067.
Emulsor. 581, 583.
Emund Gammal. 71.
Emå. 677.
Enafors. 364.
Enareträsk. 166.
Endowment Funds. 1097.
Eneman, M. 441, 489.
Enström, G. x, 338, 456, 457, 482.
Engelbrekt. 76, 78, 142, 272, 954.
Engelholm. 108.
Engelsberg. 679.
Engeström, Nina von. 795.
Engineers. 216, 217, 218, 219.
England. 123, 124, 125, 140, 147, 241, 269, 270, 272, 274, 301, 307, 312, 354, 368, 374, 382, 425, 455, 514, 535, 554, 559, 560, 563, 567, 569, 579, 583, 584, 591, 635, 636, 637, 664, 667, 694, 697, 706, 728, 731, 766, 778, 783, 796, 812, 822, 826, 828, 837, 842, 843, 848, 890, 894, 911—913, 928, 945, 946, 982, 984, 1045, 1058, 1080. Cf also Great Britain and United Kingdom.
Engström, N. vi, 593.
Enhorn, Jurgen. 807.
Enhörning, J. A. 645.
Enkullen. 887.
Enköping. 934.
Enlisted Soldiers. 214, 216, 219.
Enontekis. 93.
Enrolment. 214, 215, 216.
Enskede. 546.
Enskifte see Re-parceling of land.
Enström, A. vii.
Entail. 144, 145.
Epidemics. 244, 245.
»Era of Liberty». 87, 172, 397, 400, 423, 511, 591, 593, 765.
Erdmann, A. 442, 444, 473, 474, 485.
—, E. iii, vi, 474.
Eric of Pomerania. 76, 142.
Eric, St. 73, 74.
Ericson, Nils. 977.
Ericsson, A. 493.
—, John. 133, 476, 766, 862, 908, 977.
—, L. M. 862, 881, 908, 1016.
—, Sten. 587.
Eriksberg Castle. 161, 412.
— Mechanical Works. 879, 881.
Eriksdal. 46.
— (Saw-mill). 645.
»Eriksgata». 995.
Eriksson, Chr. 420, 905.
—, Jak. 593.
—, J. 468.
Ermine. 61.
»Ernst Ahlgren». 407.
Ersta. 270.
Eskers. 17.
Eskil. 74.
Eskilstuna. 103, 108, 343, 346, 347, 543, 586, 587, 772, 789, 866, 880, 881, 882, 883, 884, 889, 907.
— Kanal. 956, 957.
— Industry. 882, 883.
— Steel-pressing Co, Ltd. 586.
Eslöf. 45.
Essen-Möller, G. E. 464.
Estates. 86, 90, 141, 142, 143, 170, 171, 172, 173, 174, 518, 559.
Esthetics. 451, 452.
Esthonia. 81, 83, 85.
Estimates, Budget. 177.
Estlander, C. G. 450.
Ethnography. 449.
Eugen, H. R. H. Prince. 31, 430, 905, 1104.
Eugenia Home. 1098.
Europe. 97, 100, 113, 114, 122, 123, 130, 212, 358, 529, 619, 715, 757, 919, 979, 989, 990, 991, 1010.
Evaporation. 35.
Excelsior Co, Ltd. 880.
Excess of births. 92, 96, 98, 99, 100, 114, 129, 502.
Exchange. 231, 916.
Exchequer. 194, 204, 207.
Excise. 207, 208, 781, 785, 791, 1108.
Executions. 235.
Exemption from Taxes. 143.
Expectation of Life. 125, 1079, 1107.
Explosives. 700, 855, 857—861.
Export Duties. 632, 637.
Exports. 516, 517, 518, 522, 532, 533, 535, 548, 550, 557, 563, 567, 569, 571, 579, 582, 583, 584, 635, 638, 639, 658, 660—665, 667, 675, 676, 684, 685, 694, 696, 697, 708, 717, 725, 726, 751, 752, 753, 755, 758, 775, 776, 778, 787, 794, 798, 801, 806, 810, 811, 822, 825, 826, 828, 831, 837, 839, 848, 868, 917, 918, 919, 920, 921, 922, 924, 925, 926, 927, 928, 929, 949.
Expressions, geographical. 3.
Extent. 1, 2, 497.
Extractor Co, Ltd. 880.
Eyes. 134.

Factories. 767—769, 770, 772, 779, 780, 785, 854, 858.
Fagerlin, F. 425.
Fagersta. 877, 881, 887, 888.
Fagervik. 645.
Faggot, J. 590.
Fahlbeck, P. vi, 156, 455, 457, 507, 550
Fahlcrantz, A. 428.
—, K. J. 424.
Fahlgren, Elisabeth. 434
Fahlman, Louise. 435.
Fahnehjelm, O. 908.
Faience. 844.
Fairs. 934, 935, 940.
Falk, M. vi, 481.
Falkenberg. 329, 646, 948.
Falköping. 42, 76.
Falköping-Ranten. 364.
Fallows. 521.
Fallow Deer. 65, 670, 672.
Fallstedt, I. 419.
Fallström, D. 408.
Falsterboref. 961.
Falun. 24, 106, 108, 280, 374, 762, 889, 980, 985.
— Carriage Factory. 875, 880, 888.
— Copper Mine. 40, 108, 203, 689, 700, 754, 755, 756, 758, 759, 760, 764, 861.

Digitized by Google

Farms. 160, 515, 518, 520, 607, 609.
Farmers' Societies. 608.
Farriery. 597.
Fastbom, E. 435.
Faults. 44, 45, 46.
Fauna. 60
Faxefjäll. 11.
Faxelfven. 666.
Fearnley. 483.
Fecundity. 92, 120, 121, 122, 150.
Fehr, F 436.
Fehrman, D. 418.
Feilitzen, C. von. 593, 606.
—, H. von. 444.
—, U. von. VII, 614, 1080.
Fejan. 245.
Felspar. 39, 682, 688, 836.
Fences. 616.
Fencing (sport). 348, 352, 353, 368, 375.
Fen-culture Society. 517, 521.
Fenix (Insurance Company). 1044.
Fern. 55, 58.
Ferries. 948, 994.
Fertilizers. 855, 856, 857.
Festivals. 158, 159.
Feticide. 153.
Feudalism. 74, 142, 170, 191.
Fichte, J. G. 438.
Fief. 191.
Fieldfare. 62.
Field-hospitals. 220.
Field-telegraph. 216, 220.
Field-vole. 61, 62.
Figs. 545.
Fighting-ships. 224.
Filipstad. 762, 909.
Finland. 1, 28, 36, 60, 73—75, 83, 85, 88, 91, 96, 100, 102, 105, 122—125, 130, 137, 138, 142, 154, 198, 203, 268, 274, 283, 301, 305, 312, 333, 374, 382, 389, 406, 450, 487, 511, 529, 551, 557, 567, 569, 570, 577, 619, 638, 664, 667, 697, 825, 831, 839, 890, 902, 911, 924, 925, 929, 935, 947, 948, 977, 980, 1045.
—, Gulf of. 70.
Finns. 91, 93, 268, 299.
Finnboda. 864, 869, 871, 960.
Finnmossen. 691.
Finspång. 679, 708, 764, 877, 881.
Fir. 54, 55, 60, 632, 633.
Fire-alarm Apparatus. 881.
Fire-bricks. 840, 841, 842.
Fire Clays. 682.
Firewood. 661.
Fireworks. 860.
First Chamber. 179, 180.
Firwoods. 51, 52, 54, 55, 56, 57, 60.
Fischerström, Joh. 590.
Fish. 66, 67, 674, 675, 676, 677, 678, 928.
Fish Culture. 678, 679.
Fishery administration. 680.
Fishing. 68, 365, 368, 501, 508, 509, 674, 675, 677, 678, 679.
Fish-pickling Businesses. 793.
Fiskeby. 831.
Fjellstedt School. 329.
Flach, S. 564.
—, W. VI, 593.
Flag. 168.
Flahult. 607, 609.
Flats. 165.
Flattening Hammer. 731.
Flax. 541, 804, 806, 921, 929.
Flax-mills. 804, 806.
Fleet. 224.
Flen. 980.
Flint. 46.
Floating. 652—657, 665, 666, 957.
Floating-channels. 654, 655.
Floating-ways. 652, 653, 657.
Floding, P. G. 424.
Flodström, I. IX, 119, 457, 665.
›Floe-rat‹. 66.
Flora. 51, 59, 60.
Floriculture. 546.
Florida. 856.
Florman, A. H. 459, 598.
Flounder. 676.
Flour. 516, 532, 777.
Flour-mills. 770, 776, 777, 1068.
Flycatcher. 62.
Flygare-Carlén, Emelie. 406.
Flyinge. 554.
Flåsjön. 11.
Foals. 550.
Fodder Plants. 521, 539.
Fog. 33.
Fogelberg, B. E. 418.
Fogg, J. 591.
Fole. 880.
Folkbanker (›People's banks‹). 1037, 1038.
Folk-lore. 449.
Folkunga Line. 73, 74, 91, 170.
Food. 155, 156, 923.
Football. 372.
Foreigners. 93, 1060, 1061.
Foreign Office. 186, 188, 190, 196.
— Minister. 197.
— Trade. 910.
Forest Funds. 253, 626.
— Industries. 635.
— Institute. 627, 633, 634.
— Legislation. 627, 629, 630, 631.
— Service. 626, 627, 628.
Forestry. 499, 619, 633, 634.
Forests. 14, 16, 35, 193, 497, 499, 521, 619.
Formations, geological. 37, 44.
Fors. 883.
Forsberg, N. 427, 428.
Forsell, J. 433.
—, K. G. af. 457.
Forsgrén, R. 382.
Forsgren's separator. 704.
Forshaga. 646.
Forskål, P. 87, 467, 470, 489.
Forsmo Bridge. 981, 982.
Forssa. 645.
Forsse. 604.
Forssell, H. 197, 447, 455, 457, 549, 593.
Forsslund, K. E. 408.
Fortresses. 221, 228.
Fossils. 43, 44, 46, 48, 50.
Fowls. 568.
Fox. 62, 65, 671.
Frænkel, K. 492.
France. 1, 2, 114, 123—125, 137, 147, 149, 154, 283, 301, 321, 356, 382, 400, 427, 455, 525, 529, 531, 535, 542, 620, 637, 661, 662, 664, 692—694, 697, 715, 727, 731, 750, 758, 778, 783, 787, 822, 826, 843, 911, 913, 919, 924, 925, 927, 929, 930, 945, 947, 948, 949, 977, 1034, 1045.
Francke-Comté Forging. 731, 732.
Franchise. 143, 179, 181, 182, 1107.
Francke, D. 821.
Frank, J. 458, 465.
Franklin, B. 476.
Frans Schartau's Commercial College. 936, 937, 938.
Franzén, F. M. 269, 402.
Fraser, Daniel. 872.
Fraud. 153.
Frederick I. 86.
Fredholm, I. 482.
›Fredrek på Rannsätt‹. 408.
Fredrika Bremer Society. 275.
Fredrikshald. 81.
Fredrikson, G. 434.
›Free Church Sect, The‹. 269.
Free-hold. 69, 520.
Freemasons. 168, 1068.
Freeports. 933.
Freestorage. 933.
›Freetowns‹. 899.
Free-trade. 514, 929
Freja Mining Company, Ltd. 694.
French Reformed Church. 269.
Fresco Paintings. 331.
Frestadius, A. W. 870.
Fridhem Dwelling Accommodation Company, Ltd. 1087.
Friends of Art Needle Work. 275, 795, 903, 904.

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Friends of the Honest Poor. 1098.
Fries, B. 470.
—, Elias. 467, 468.
—, Ellen. 447.
—, S. A. 436.
—, Th. M. 467, 468, 469.
Friesen, O. von. III, v, 443.
—, S. von. 454.
Fristedt, R. F. 461.
Fritsla, 801.
Frog. 62.
From, Per. 880.
Frost. 30, 602.
Fruits. 545, 546, 920, 921, 927.
Fryken Lake. 54.
Fryxell, A. 446, 453.
Fröberg Institute. 1098.
Fröding, G. 408.
Frövi. 980.
Fuel. 709—713, 853.
Fuel-wood. 658, 664, 667.
Fulufjäll. 11.
Fundamental Laws. 174, 177, 196.
Funds. 253, 258, 340, 380, 381, 382, 626, 1098.
Furs. 810, 811, 922, 928.
Furniture. 828, 902, 905.
Fuse. 860.
Fürst, C. M. 135, 460, 465.
F. V. O. see Charity Organization Society.
Fylgia. 1047, 1048.
Fårön, 567, 796.
Fårösund. 228.
›Fåbodar›. 539.
Färeköp. 847.
Färöe Islands. 91, 430.
Förenade Konstgjuterierna v. United Artistic Foundries.
Försäkringsföreningen. 1049.
Försäkringsmannaföreningen. 1049.

Gabbro. 36, 39.
Gadd, A. 590.
Gahn, Henrik. 861.
—, J. G. 478.
Galervarfvet. 960.
Galicia-Bukovina. 123, 529.
Galoshes. 815.
Game. 669, 670, 671, 672, 673.
Game-law. 669.
Games. 368, 372.
Gamlabro. 798.
Gamlestadens Fabriker. 801.
Gardens. 520, 521, 544—548.
Garpenberg. 733.
Gas-works. 852, 853.
Gauge. 980, 981.
Gauthiod. 1043.
Gay-Lussac, L. J. 478.
Gedsholm. 575.
Geese. 62, 568, 569.
Gefle. 24, 41, 106, 108, 179, 180, 256, 259, 378, 547, 604, 610, 664, 772, 789, 811, 880, 889, 890, 919, 931, 938, 944, 948, 960, 966, 980, 1033.
Gefleborg Län. 33, 94, 98, 114, 152, 240, 281, 521, 524, 528, 529, 531, 620, 626, 641, 642, 693, 715, 725, 770, 882, 853, 881.
Gefle Burgher School. 938.
Gefle-Posten. 397.
Geijer, Erik Gustaf. 76, 269, 319, 403, 404, 432, 439, 446, 453.
—, K. R. 440.
—, P. A. 444.
Geijerstam, G. af. 407.
Gelatine. 814.
Gellerstedt, A. Th. 163, 408, 414, 425.
—, P. E. 462.
Gellivare. 12, 40, 103, 108, 266, 360, 365, 366, 686, 687, 688, 689, 691, 692, 694, 695, 857, 980, 985.
— Ore-field Company, Ltd. 694.
General Board of Customs. 917, 933, 934.
— Export Association of Sweden. 917.
— Map Department. 201.
— Post Office. 1001, 1005.
— Post Office Building. 414.
— Supply. 207, 208, 250, 251, 253.
— Swedish Electric Company, Ltd. 882, 888, 890.
Geneva. 354.
Gentry. 170, 171.
Geography. 1, 488—496.
Geological Museums. 339
— Survey. 194, 202, 203, 474.
Geology. 36, 203, 204, 472—474.
St. George's Hospital. 248.
Germanic Race. 91, 169.
Germans. 68, 69, 74, 79, 91, 411, 416, 910, 911.
Germany. 1, 79, 82, 83, 123, 124, 130, 137, 147, 149, 154, 241, 270, 283, 299, 301, 307, 356, 358, 366, 374, 382, 389, 400, 455, 487, 514, 525, 527, 529, 531, 563, 577, 584, 586, 591, 594, 661, 663, 664, 667, 678, 679, 692, 693, 694, 696, 697, 715, 752, 758, 781, 787—790, 796, 812, 814, 822, 826, 828, 831, 842, 890, 892, 894, 919, 924, 925, 926, 927, 929, 930, 945, 946, 947, 948, 950, 970, 977, 980, 982, 1010, 1034, 1045.
Gestrikland. 3, 4, 38, 135, 646.
Gezelius, J., Senior. 453.
Gide elf. 14.
Gilbert. 592.
Gillberg, J. 424.
— Foundling Hospital. 1098.
Gimån. 657.
Ginger-beer. 791.
Girls' Schools. 286.
Gisberg, Sofia. 904.
Gisbel, Selma. 904.
Gjallarhornet. 1049.
Glacial-clay. 48.
— Epoch. 9, 11, 12, 13, 14, 15, 18, 19, 47, 48, 49, 50, 51, 60.
— Ocean. 48, 49, 50.
Glaciers. 11, 47, 48.
Gladhammar. 758.
Glafva. 845, 847.
Glas, O. 462.
Glass. 833, 845—849, 906, 926.
Glass-works. 845, 846, 847. 1068.
Gleerup, E. 493.
Glimmingehus. 410.
Gloves. 810, 812.
Glucose. 778.
Glue. 814.
Gluttons. 62, 671.
Glödlampfabriken i Nyköping. 890.
Gneiss. 13, 36, 37, 38, 39, 43, 45, 688, 835.
Goats. 541, 550, 551, 557, 567.
Goethe, J. W. 406.
Gold. 682, 689, 753, 754, 755, 758, 760, 884, 885, 1021, 1022, 1023, 1028.
— Articles. 1023, 1059.
Gooseberries. 546, 788.
Goshawk. 64.
Gothenburg. 17, 24, 28, 34, 103, 106, 108, 110, 111, 134, 147, 165, 179, 180, 195, 200, 221, 228, 234, 242, 246, 256, 259, 268, 277, 279—282, 285, 299, 301, 311, 312, 316, 318, 326, 327, 329, 331, 333, 338, 340, 341, 345, 359, 363, 364, 372, 378, 382, 394—396, 414, 415, 418, 419, 440, 447, 457, 464, 546—548, 563, 583, 585, 604, 638, 644—646, 664, 772, 777, 778, 786, 789, 792, 801, 807, 809, 828, 852, 853, 866, 873, 881, 885, 888, 890, 911, 913, 914, 916, 919, 931, 934, 936—939, 944, 948, 960, 962, 966, 980, 983, 994, 995, 1001, 1002, 1005, 1006, 1009, 1011, 1014, 1022, 1033, 1044, 1080, 1087—1089, 1095. 1099—1101, 1103, 1105, 1107.
— Commercial College. 936, 937.

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Gothenburg Garden Society. 546.
— High School see University of Gothenburg.
— Home for the Sick. 1098.
— Museum. 383, 385, 386, 427, 429, 1098.
— Poor House. 1098.
— Royal Yachting Club. 372.
— Savings Bank. 1088.
»Gothenburg System». 150, 279, 280, 281, 282, 283, 396.
Gothia. 168. Cf. Götaland.
Gothia. 1048.
Gotland. 3, 4, 19, 20, 22, 30, 33, 34, 42, 43, 44, 48, 50, 58, 72, 79, 81, 83, 92, 93, 94, 98, 99, 102, 108, 114, 121, 135, 160, 163, 214, 216, 218, 220, 221, 232, 281, 363, 372, 409, 421, 512, 521, 524, 525, 528, 531, 533, 538, 541, 543, 545, 546, 556, 559, 562, 565, 567, 615, 629, 632, 641, 675, 677, 770, 779, 789, 796, 839, 845, 910, 963.
— Pony. 555.
Gotska Sandön. 20, 567.
Govenius, V. 1109.
Government. 84, 86, 87, 89, 103, 168, 170, 171, 172, 174—177, 183, 184, 190, 192, 194, 195, 205, 221, 232, 251.
— Printing-office. 893, 894, 895.
Governors. 191, 192, 195, 215, 251, 653, 654.
Grafström, Thyra. 905.
Grain. 516, 528, 532, 784, 785. Cf. Cereals.
Granberg, O. 451.
Granefors. 757, 877.
Graningeverkens Aktiebolag. 643.
Granite. 13, 36, 37, 39, 835, 836.
Granqvist, P. G. D. 477.
Grapes. 546.
Graphic Industries. 892—896.
Graphite. 682.
Graptolites. 43.
Grass. 53, 56, 57, 58, 515, 539.
Gravel. 47, 48.
Grayling. 678.
Great Britain. 1, 154, 283, 487, 525, 529, 531, 661, 662, 664, 692—694, 715, 750, 919, 924, 925, 945, 950, 1034.
»Great Death». 76.
Great-owl. 671.
Grebe. 65.
Greece. 826.
Green Crops. 539.
Greenland. 48, 389, 490, 492.
Greenstone. 39.
Greenwich. 2, 24.
Greifswald. 333.
Grenna. 108, 364, 545, 547.
Grimm, J. 442.
—, W. 442.
Grimsby. 974.
Grind-stone. 44, 46.
Gripsholm Castle. 80, 411, 414, 421, 559, 672.
Grisslehamn. 934.
Grits. 777.
Groats. 777.
Grotius, Hugo. 85, 437.
Grubbe, S. 439, 452.
Grundström, C. 414.
Grycksbo. 831.
Grytgöl. 881.
Grythyttan. 40.
Gråberg till Hemsö, J. 457.
Grängesberg. 687, 688, 689, 690, 691, 692, 693, 697, 699, 700, 701, 704, 744, 857, 887, 890, 980, 1089.
— Mining Company, Ltd. 693.
Grängesberg-Oxelösund Traffic Company, Ltd. 693, 695.
Gröndahl, G. 1109.
Gröndal. 704.
Grönkvists Mekaniska Verkstad. 881.
Guano. 857.
Guide-books. 361, 367.
Guilds. 105, 897, 898, 899, 900, 1067, 1091.
Guinchard, J. x, 1084.
Gulbranson, Ellen. 433.
Gulda, Hj. VIII.
Guldsmedshyttan. 41.
Gulf Stream, The. 23.
Gull. 66.
Gullberg, Hj. 457.
Gullstrand, A. 464.
Gullöfors. 881.
Guns. 220, 222, 224, 867, 881.
Guncotton. 859.
Gunnery Schools. 217.
Gunpowder. 857, 859.
Gussander, P. U. 575.
Gustafsberg (Chinaware works). 840, 841, 842, 843, 906.
— (Saw-mill). 645.
Gustafsberg. 679.
Gustavus, H. R. H. the Crown-prince. 372, 673.
Gustavus Vasa. 77, 79, 80, 142, 171, 191, 222, 261, 383, 393, 410, 416, 421, 430, 551, 559, 627, 760, 763, 829, 911, 934, 941, 954, 961, 995, 998.
Gustavus II Adolphus. 80, 81, 82, 83, 84, 85, 171, 191, 210, 212, 262, 319, 340, 430, 445, 553, 763, 764, 897, 911, 935, 954.
Gustavus III. 87, 143, 173, 174, 222, 276, 375, 376, 378, 383, 402, 404, 412, 417, 431, 434, 615, 765, 766, 899, 912 935, 1061.
Gustavus IV Adolphus. 88, 174, 431, 912.
Gustavus Adolphus College. 333.
Gusum. 757.
Gwyniad. 678.
Gyldén, P. H. 484.
Gyllenborg, G. F. 401.
Gyllenhaal, L. 472.
Gyllenkrook, F. 605.
Gyllenstierna, Christina. 78.
—, Johan. 142.
Gymnasiums. 319.
Gymnastic Clubs. 328.
— Orthopedic Institute. 354. 355.
Gymnastics. 291, 295, 297, 322, 348—359, 375, 453, 1103.
Gynecology 464.
Gyrfalcon. 64.
Gysinge. 752, 880, 888.
Gädda, P. 961.
Göransson, G. F. 734, 735, 877, 908.
— Mechanical Works, Ltd. 359, 881.
Göta Kanal. 363, 955, 956, 957, 958.
— Elf. 17, 68, 108, 677, 954, 995.
— Hofrätt. 230, 232.
Götaland. 3, 4, 31, 33, 65, 69, 92, 93, 98, 168, 232, 497, 1004.
Göteborg see Gothenburg.
Göteborgs Aftonblad. 397.
— Fönsterförsäkringsbolag 1049.
— Handels- och Sjöfartstidning. 397.
Göteborg Mechanical Works. 873, 879, 880, 881.
Göteborgs och Bohus Län. 33, 93, 94, 98, 114, 281, 311, 521, 524, 528, 531, 641, 770, 801, 809, 831, 836, 1039.
Göthe, E. G. 418.
—, G. 451.

Haasum, E. A. x.
Hadar. 881.
Haddock. 676.
Hadorph, J. 441, 445.
Hæffner, J. 431.
Hæmatite. 692.
Haga. 546.
Hagelsberga. 555.
Hagfors. 735, 747, 877.
Haglund, R. 430.
Hagström, K. L. 488.
Hagströmer, A J. 458.
Hague Convention. 232
Hahr, A. 203, 451.
Hail. 33, 34.
Hair. 134.

Digitized by Google

Hair-grass. 55, 58.
Hair Manufactures see Hides.
Hair-pins. 902.
Hake. 676.
Halda. 879, 881, 886.
Halibut. 676, 677.
Hall. 312.
Hall, P. A. 423.
Halland. 3, 4, 18, 20, 21, 22, 33, 58, 61, 70, 74, 75, 83, 92, 94, 98, 114, 131, 135, 204, 281, 392, 517, 521, 524, 526, 528, 531, 538, 555, 562, 575, 624, 641, 646, 675, 676, 770, 796, 804, 836, 936.
Halland Ridge. 21, 45.
Hallberg, C. G. 885, 907.
Halldin & C:o. 880.
Halleberg. 16, 42, 43.
Hallén, A. 432, 433.
Hallenberg, J. 446.
Hallman, Maria. VII, X.
—, P. 415.
Hallquisth, E. 415.
Hallsberg. 881.
Hallsta. 643.
Hallstahammar. 877.
Hallström, I. 432.
—, P. 408.
Hallströms Kniffabriks Aktiebolag. 881.
Hallwyl Palace. 414.
Halmstad. 24, 106, 547, 587, 603, 663, 772, 798, 799, 800, 809, 880, 948, 960, 980.
Halmstads Mekaniska Verkstad. 587, 880.
Hamberg, A. 474, 487, 488, 492, 495.
—, H. E. 33, 35, 488.
Hamburg. 783, 826, 833, 868, 936, 974.
Hammar, J. A. H. 458.
Hammarberg, H. E. 486.
—, N. P. 460.
Hammarskjöld, A. X, 447.
—, Hj. IV, V.
—, L. 450, 452.
Hammarstedt, N. E. V.
Hammarstén, O. 460, 480.
Hampstead. 354.
Hampton Roads. 133.
Handarbetets Vänner v. Friends of Art Needle work.
Handicraft. 763, 896—901.
Handiwork. 828.
Handöl. 364.
Hannover. 554, 555.
Hanse Towns. 74, 75, 79, 363, 635, 911.
Haparanda. 2, 24, 26, 27, 28, 50, 299, 546, 948.
Harbours. 913, 960. Cf Ports.
Hare. 61, 62, 670, 672.
Harriers. 672.
Harrows. 542, 881.
Harsprånget. 365.
Hartelius, T. J. 356.
Hartman, C. V. 494.
—, K. J. 467.
Harvest. 159.
Harvey, W. F. X.
Hasselberg, K. B. 477, 484.
—, P. 419.
Hasselquist, F. 467, 489.
Hats. 154, 808, 809.
Hawks. 64, 671.
Hawthorn. 56, 57.
Hay-harvest. 157, 540.
Hazel. 17, 56, 57.
Hazel-grouse. 64. 670, 672.
Hazelius, A. 387, 391, 449, 904.
Headings. 664.
Health Resorts. 246.
Heather. 19, 55, 58.
Heaths. 58, 60.
Hedberg, Fr. V, 408.
—, G. 906, 907.
—, K. 408.
—, T. 408.
Hedbom, K. 461.
Hedemora. 329.
Hedenblad, I. 433.
Hedengren, O. 580.
Hedenius, P. 461.
Hedenstierna, A. 408.
Hedenström, J. A. 832.
Hedgehog. 65.
Hedin, A. 1072.
—, S. 461.
—, Sven. 378, 493.
Hedlinger, J. K. 418.
Hedlund, H. 415.
Hedræus, B. 482.
Hegel, G. W. Fr. 438.
Heidenstam, V. von. 407.
Heifers. 551, 565.
Height, personal. 134, 136, 137.
Heimdal. 396, 1102.
Heimdall (Insurance Company). 1048.
Heine, Heinrich. 405.
Helagsfjället. 10, 11.
Heljestrand, A. VII.
Hellefors (Saw-mill). 646.
— Styckebruk. 880, 887.
Hellquist, E. 443.
Hellqvist, K. G. 427.
Hellsjön. 887.
Hellstenius, J. 457.
Hellström, Anna. 433.
—, Th. 463.
Helsingborg. 45, 106, 108, 218, 246, 311, 312, 372, 419, 420, 547, 583, 754, 760, 772, 778, 789, 815, 816, 854, 888, 889, 931, 943, 944, 948, 960, 980, 983, 995, 1033.
— Copper-works. 754.
Helsingborgs Mekaniska Verkstad. 879, 880.
Helsingborgs-Posten. 397.
Helsinge Regiment. 136.
Helsingland. 3, 4, 14, 15, 38, 39, 40, 47, 59, 135, 154, 248, 392, 645, 804.
Helsingfors. 333, 890.
Hemenway, Mary. 354.
Hemp. 806, 921, 922, 929.
Henneberg, R. 433.
Henning, E. 468.
Henschen, S. E. VI, 463.
Herjedalen. 3, 4, 5, 10, 15, 27, 39, 41, 51, 72, 74, 83, 135, 645.
Hermansson, G. 415.
Hermelin, S. G. 202, 203, 473, 694.
Hernqvist, P. 598.
Hernösand. 23, 24, 26, 106, 218, 346, 365, 545, 603, 644, 662, 804, 888, 889, 919, 943, 944, 948, 966, 1011.
Heron. 65.
Herrevadskloster. 555.
Herrings. 67, 674, 675, 676, 813, 924, 926.
Herrlin, A. 441.
Herräng. 704.
Hesselkulla. 689.
Hesselman, H. VI.
Hessleby. 247.
Hessleholms Gjuteri och Mekaniska Verkstad. 880.
Heyman, E. 461.
Hides. 516, 768, 810, 811, 920, 922, 927, 928.
Hierta, Lars. 381, 405, 817. Cf. Lars Hierta's Memorial Foundation.
—, Wilhelmina. 381.
High Court of Justice. 174, 176, 178, 179, 183, 192, 231, 233.
Higher Seminary for Lady-Teachers. 329, 331, 332, 1101.
High Governor. 195, 196, 256.
High-roads. 193, 936, 996, 998.
High Schools see Universities.
Hildebrand, B. E. 448, 449, 465.
—, E. III, 447.
—, H. 447, 448, 449, 465.
—, K. V, X.
Hildebrandsson, H. H. 486, 488.
Hill, K. J. D. 481.
—, Octavia. 382.
Hillberg, E. 435.
Hillestrőm, P. 423.
Hisinger, V. 473, 479.
Hissmoforsen. 887.
Historical Museums. 384, 385.
History. 68, 69, 445—447.
—, geological. 5.
— of Art. 450, 451.
— of Literature. 449, 450.

Digitized by Google

Hjelmare Canal. 955, 956, 957.
Hjelmaren, Lake. 17, 42, 50, 95, 108, 954, 959, 995.
Hjo. 245, 364.
Hjorth, B. A. 586.
Hjortsberg, L. H. 434.
Hjärne, H. 447.
—, U. 458, 461, 463, 472, 477, 485, 494.
Hob-nails. 867.
Hockey. 375.
Hof, S. 442.
Hofors. 887, 888.
Hoffvenius, P. 458, 462.
Hofvid. 645.
Holland. 374, 400, 425, 466, 559, 560, 561, 580, 635, 662, 778, 783, 912, 1045.
Hollingworth & C:o, Andrew. 587, 881.
Holm, G. 471, 474.
Holma. 804.
Holmberg, Carl. Mechanical Works. 587, 873, 880.
—, T. 317, 454.
Holmbergsson, J. 438.
Holmens Fabrik. 801, 831.
Holmgren, E. 459.
—, Fr. 460.
—, Hj. 481.
—, H. T. 414.
—, K. A. V. 477.
Holmia (Dwelling Accommodation Company, Ltd). 1086.
Holmquist, P. 495.
Holmqvist, F. 938.
—, V. 434.
Holmström, Leonard. VI, 313, 454.
Holmsund. 642.
Holstein. 74, 575.
Homes in the Country Co., Ltd. 1090.
Home-trade. 910, 934—936,
Homicides. 151, 153.
Honey. 569.
Honeysuckle. 56.
Hooks and Eyes. 902.
Hoorn, J. von. 464.
Hops. 789, 921, 926.
Horn. 920, 922.
Horn, Arvid. 87.
—, Gustavus. 85.
—, Klas. 81.
Hornafvan—Storafvan. 11, 50.
Horndal. 887.
Horse-races. 373.
Horse-rakes. 543, 881.
Horses. 515, 550, 551—557, 563, 610.
Horse-shoes. 867.
Horticultural Societies. 547, 548.
Horticulture. 544.
Hospices. 253.
Hospitals. 237, 239, 240, 241, 242, 243, 244, 339.
Hotagen. 11.
Hotels. 364, 367.
Household Schools. 1101.
Households. 157.
House of Nobility. 82, 171, 412, 422.
Houses. 159, 160, 161, 162, 164, 165. Cf. Dwellings.
Housing Societies. 165, 1085.
Hudiksvall. 662, 889, 948.
Hudiksvalls Trävaruaktiebolag. 645.
Hult (Iron Works). 881.
— (Saw-mill). 646.
Hult (Brothers). 864, 879, 880, 881, 890.
Hult, C. A. 908.
—, H. IV.
—, O. W. 908.
Hultgren, E. O. 460, 1080.
Hultkrantz, J. W. 136, 458, 465.
Hultman, C. A. 1015.
—, F. V. 481.
Hultsfred. 980.
Humber & C:o. 880.
Humboldt, A. von. 467.
Humidity. 35.
Humlegården. 370, 393, 419, 547.
Hundred. 69, 202, 248, 259.
Hundshögen. 11.
Hungary. 123, 124, 137, 154, 301, 529, 586, 638, 693, 694, 715, 750, 868, 930, 977.
Hunneberg. 16, 42, 43, 373.
Hunting. 68, 368, 373, 501, 669. Cf. Shooting.
Huskvarna. 290, 774, 809, 871, 872, 880, 881, 884, 1089.
Huss, Magnus. 277, 461, 462.
Husum. 643.
Husâ. 754.
Hübner, Berta. 905.
Hwasser, Elise. 434.
—, I. 461, 462.
Hven. 30. 35, 484.
Hvilan. 313, 314, 315.
Hvitfeld Fund. 1098.
Hybo. 645.
Hydrographical-biological Commission. 487.
Hydrography. 484—488.
Hydropathic Establishment. 245.
Hygiene. 237—248, 251, 461.
Hygienic Museum. 382.
Hyltén-Cavallius, G. O. 449.
Hymnal. 267, 402, 431.
Hyperite. 36, 39.
Håfverud. 957.
Håkansboda. 754, 758.
Håkansson, Julia. 435.
Hålahult. 247.
Håstaholmen. 645.
Hägg, A. 430.
—, J. A. 433.
Hälleflinta. 36, 38, 40.
Hällström, G. G. 475.
—, K. P. 483.
Höckert, J. 425.
Höganäs. 44, 45, 838, 840, 845, 888, 907.
Högbom, A. G. 13, 474.
Högqvist, Emelie. 434.
Höijer, B. 438, 452.
Höjentorp. 559.
Höjer, N. 338, 447.
Höpken, A. J. von. 434.
Hörningsholm. 645.

Ice. 32, 33, 943, 944.
Icebreakers. 224, 944.
Iceland. 91, 301, 389, 677.
Ice-yachting. 370, 374.
Ide. 678.
Idiots. 307, 310.
Idre. 631.
Idrott. 367.
Idun. 1049.
Iggesund. 645, 708, 735, 877.
Ihre, J. 441, 444.
Illegitimacy (of births). 92, 114, 122, 126, 146, 147, 148, 150, 151, 153, 257.
Illinois. 132, 270, 333.
Illiteracy. 137, 153, 167, 299.
Immeln. 58.
Immigration. 114, 115, 128, 129, 130, 1107.
Imports. 516—518, 522, 532, 533, 535, 548, 550, 557, 562, 563, 567, 569, 571, 584, 639, 666, 667, 676, 684, 685, 708, 717, 726, 751—753, 755, 767, 775—778, 782, 792, 794, 796, 798, 801, 806, 808, 810, 811, 825, 831, 839, 847, 868, 917—922, 925—930, 949
Import Duties. 930, 931.
Incendiary Fire. 153.
Income. 145, 502, 504—506.
Income-tax. 1107.
Increase (of Population). 96, 97, 98, 114, 115, 129.
Indalselfven. 6, 12, 15, 365, 657, 666, 677.
India. 270, 301, 425, 826.
Indians. 138.
Indian Corn. 535, 928.
India-Rubber. 768, 815, 816, 920, 922, 929.
Industrial Art. 409, 902.
— Legislation. 1050.
Industry. 193, 498, 763, 1109.
Infanticides. 151, 153.
Infantry. 213—220.
Infant Schools. 289, 293.
Infirmaries. 237, 239.
Ingots. 707, 708, 732—752.
Ingria. 83.
Inheritance. 273.

Digitized by Google

Inland Towns. 911, 935.
Inns. 998, 999. Cf Hotels.
Insects. 61.
Institute for the Blind. 309.
Instruments. 869, 921.
—, Magnetic. 697, 698.
—, Scientific. 885, 886.
—, Surgical. 885.
Insurance. 206, 1040—1049, 1072.
— Companies. 1054, 1109.
Interim Administration. 185, 186, 188.
International Bureau for Measures and Weights. 1061.
— Council of Women. 274, 275.
— Federation. 285.
Invalidity. 1073, 1074, 1076, 1079.
Inventors. 908.
Iowa. 132.
Ireland. 5, 128, 154, 301, 529, 531, 693, 694, 715, 750, 919, 924.
Irizar, J. 494.
Iron. 69, 500, 681, 682, 685, 706, 707, 708, 924, 926, 929, 991.
Iron-age. 69.
Iron and Steel Industry. 706—752.
Iron and Steel Ware Factories. 863, 1068.
Iron Bedsteads. 881.
Ironclads. 222, 224, 864, 865, 871.
Iron Goods. 1059.
Iron Institute. 343, 761.
Iron Mines. 685.
Iron-ores. 38, 39, 40, 108, 500, 502, 685, 687—689, 692—697, 707, 922, 926, 929.
Iron-ore Fields. 683, 685, 687, 689—691.
Iron-ware. 108, 867, 868, 928.
Iron Wire. 902.
Iron Works. 724, 725, 768, 770, 875, 1068.
Irvingians. 269.
Isinglass. 814.
Islinge. 713.
Isotherms. 25, 28, 29.
Italy. 114, 123, 124, 137, 147, 154, 261, 301, 356, 465, 529, 693, 930, 945, 970, 977, 979.
Iter. 1049.

Jackdaw. 65.
Jacobson, E. 414.
Jagenburg, G. 809.
Jails. 234. Cf Prisons.
St. James Church (in Stockholm). 26, 411, 416.
Jansson, G. 408.
Japan. 301, 467.
Jay. 64.
Jemtland (Province). 3, 4, 9—11, 14, 39—43, 54, 65, 72, 74, 83, 93, 102, 135, 166, 247, 298, 364, 365, 392, 567, 643, 645, 804, 836.
Jemtland Län. 33, 92, 93, 94, 98, 114, 116, 128, 148, 281, 521, 524, 528, 531, 570, 601, 641, 673, 768, 770, 1039.
Jenner Institute. 461.
Jentzer. 354.
Jews 266, 270.
Jockmock. 24, 27, 28, 366.
Johan III. 262, 269, 416, 897.
Johannedal. 645.
St. Johannes' Church (in Stockholm) 268, 415.
Johannesvik. 645.
Johansson, A. 415.
—, C. A. 579.
—, J. E. 460.
—, K. F. 444.
—, M. 436.
John and Mathilda Lenning's Home for the Sick. 1098.
Johnson, E. G. 463.
Joiners. 900.
Joineries. 770, 924, 926, 928, 1068.
Joint-stock Banks. 1030—1032, 1037, 1038.
Joint-stock Companies. 1053, 1054, 1055.
Jolin, S. 461.
Jonsered. 801, 804, 880.
Josephine (Queen). 807.
Josephson, C. D. 464.
—, E. 415.
—, Ernst. 429.
—, J. A. 432.
Journalist Club. 398.
Journal of Statistics. 198, 457.
Judges. 175, 178, 182, 196, 229—231.
Juel, O. 468.
Juhlin-Dannfelt, H. 593.
—, M. 493.
Jungner, E. V. 892, 908.
Jungstedt, A. 428.
—, Mathilda. 433.
Junker, W. J. 378.
Jurassic System. 36, 44, 45.
Jurisdiction. 229.
Jury. 228, 230, 397.
Justice. 191, 194, 228—233.
Jute. 805, 806, 921, 922, 926.
Jutland 560, 677.
Jäderholm, A. 461.
Jäderin, E. 492.
Jägerskiöld, L. A. 472, 493.
Järfed. 643.
Järfsö. 240.
Järnkontoret, see Iron Institute.
Jönköping. 24, 28, 41, 106, 108, 230, 364, 603, 607, 764, 772, 806, 823—826, 829, 831, 832, 879, 881, 948, 980, 995.
Jönköping Län. 33, 94, 98, 114, 126, 247, 290, 521, 524, 528, 531, 641, 715, 770, 796, 822, 828, 829, 902.
Jönköpings Mekaniska Verkstad. 879.
Jönsson, B. VII, 469.

Kafveltorp. 704, 754, 760.
Kalix elf. 6, 677.
Kallinge. 880, 881.
Kallmora. 41.
Kallsjön. 11.
Kallstenius, G. 428.
Kalm, P. 87, 467, 489.
Kalmar. 24, 34, 77, 106, 410, 412, 413, 421, 603, 604, 663, 772, 880, 897, 931, 948, 960, 962, 966, 995.
— Län. 33, 94, 98, 114, 115, 147, 259, 521, 524, 528, 531, 533, 538, 542, 602, 603, 641, 646, 715, 770, 836.
— Sund. 42.
— Union. 76—79, 170, 171.
Kames. 17, 48.
Kammarkollegium. 194, 383.
Kansas. 333.
Kant, Immanuel. 438.
Kantorp. 691.
Kaolin. 46.
Karesuando. 24, 26, 28, 30, 34.
Karlfeldt, A. 408.
Karl Gustafs Stads Gevärsfaktori. 884.
Karlin, G. F. J. 905.
Karlsborg (Fortress). 41, 221, 861.
— (Saw-mill). 642.
Karlsfors. 646.
Karlshamn. 24, 786, 889, 921, 948, 966.
Karlskoga. 513.
Karlskrona. 106, 108, 221, 222, 224—228, 234, 311, 364, 378, 419, 586, 772, 789, 809, 881, 948, 960, 980, 1095, 1105.
— Galvaniseringsaktiebolag. 586.
— Lampfabrik. 881.
Karlsson, K. H. 447.
Karlstad. 24, 106, 185, 772, 791, 809, 874, 948, 1099.
Karlstad and Kristinehamn Mechanical Works. 874, 879, 880.
Karlsten. 363.
Karlsvik (in Medelpad). 645.
— (in Norrbotten). 642, 1109.
Karmansbo. 722.
Karpalund. 781, 782.
Kastman, C. 454.
Katarina Elevator. 994.

Digitized by Google

Katrinefors. 829, 831, 881.
Katrineholm. 881, 980.
Kattegat. 1, 67, 204, 674—676, 954, 958.
Kebnekaise. 9, 10, 11.
Keiller, A. 873.
Kellgren, J. H. 87, 402, 431, 438, 452.
Kelvin, Lord. 698.
Kengis. 754.
Kent. 354.
Kentucky. 792.
Kerchief. 154.
Kerosene. 813, 922.
Kestrel. 65.
Keuper. 45.
Key, A. 134, 459, 461.
—, Ellen. 408, 1102.
Keyser, Peter. 416.
Key-Åberg, A. 461.
—, K. VII, VIII, 457, 770, 1084.
Kiær, A. N. 942, 945.
Kids. 550.
Kiel. 185.
Kiellman-Göranson, I. IX.
Kieselguhr. 845.
Kinda Canal. 956, 957.
King. 168, 175—177, 184, 185, 188, 191, 231, 263.
King Oscar I Memorial Fund. 1098.
King Oscar II Jubilee Fund. 247, 1098.
Kinmanson, G. 434.
Kinnekulle. 16, 42, 43, 363, 545, 839.
Kirunavara. 13, 40, 681, 687—689, 691, 692, 695, 922.
Kite. 65.
Kjellberg, A. 463.
—, J. 147.
—, J. F. 418, 419.
—, N. G. 463.
Kjellberg-Frumerie, Agnes. 420.
Kjellberg School. 329.
Kjellén, R. 447.
Kjellin, A. 752, 908.
Kjellman, F. R. 468, 469.
Kjellström, A. W. 414.
Kjernås, C. A. 885.
Klabböle. 887.
Klampenborg. 645.
Klarelfven. 6, 13, 646, 657, 666, 677.
Klason, P. 480, 851.
Klefva. 758.
Kleman, P. 733.
Klemming, G. E. 442.
Klingenstierna, S. 475, 480.
Klint, A. X.
Klippan. 831.
Klockhoff, D. 452.
Kloster. 883.
Klosterström. 874.
Kloten. 633.
Knives. 867.
Knorring, Sofia Margareta von. 406.
Knutson, K. 493.
Knutsson, Torgils. 75, 76.
Knäckebröd. 155.
Kobb, G. 482.
Koch, G. H. von. IV, IX.
—, H. von. 482.
Kock, A. 443.
Kockum, F. H. 869.
Kockum Mechanical Works. 224, 586, 792, 869, 879, 880.
Kohinoor. 881.
Kollberg, O. 735.
Kolmården. 17, 39, 836.
Kolsva. 877.
Kolthoff, G. 387, 472, 492.
Kolåsen. 247, 364.
Kopparberg-Avesta Aktiebolag. 646.
Kopparberg Län. 33, 94, 98, 114, 281, 497, 521, 524, 528, 529, 531, 620, 626, 629, 641, 692, 715, 725, 770, 853, 1004, 1035.
Kopparbergs och Hofors Sågverks Aktiebolag. 646.
Koppom. 881.
Korpilombolo. 607.
Korsnäs. 645.
Korså. 645.
Kosta. 845, 847, 849, 906.
Koster Boat. 953.
Kovalevski, Sonja. 274, 481, 482.
Krafft, Dav. von. 422.
—, P. Jun. 424.
—, P. Sen. 423.
Kramfors. 637, 643.
Krebs, S. F. 795.
Kreuger, N. 429.
Kristiania. 27, 375, 890, 980.
Kristianstad. 21, 46, 106, 230, 411, 604, 772, 786, 880, 931, 934, 948.
Kristianstad Län. 33, 94, 98, 114, 115, 521, 524, 526, 528, 531, 538, 575, 601, 624, 641, 770, 777, 784, 836, 902, 1035, 1039.
— Plain. 21.
Kristineberg. 472.
Kristinehamn. 309, 646, 761, 889, 980.
Krok, Th. 454.
Kronan. 1046, 1048.
Kronberg, J. 426, 427, 904.
Kronoberg Län. 33, 94, 98, 114, 115, 131, 521, 524, 528, 531, 575, 641, 657, 715, 770, 777, 829, 847.
Kropp, D. 804.
Krylbo. 980.
Kubikenborg. 645.
Kullberg, V. 886.
Kulle, J. 905.
Kulle, Thora. 795.
Kullemölla. 46.
Kullen. 21, 961.
Kungsholmen. 259, 396, 766, 898.
Kunkel, J. 477.
Kühn, J. 592.
Kvarnsveden. 757, 887, 888.
Kvickjock. 366.
Kåta. 167.
Känsö. 245.
Köja. 643.
Kölen. 7.
Köli-group. 44.
Köngämä (River). 2.
Köping. 880, 980.
›Köpingar› (Boroughs). 103.
Köpings Mekaniska Verkstad. 880.
Köpmanholmen. 643.
Körling, A. 433.
Köster, H. 463.

Labourer-crofters. 612. 614
Labourers' Institutes. 287, 316.
Labour Legislation. 1062—1077.
— Movement. 272, 1064.
— Statistics. 198, 793, 1080.
Laces. 808, 904.
Lactocrite. 582, 583.
Lactoserine. 581.
Ladies' Associations. 275.
Lady Doctors. 273, 274.
Læstadianism. 268.
Læstadius, L. L. 268.
Lafrensen, Nik. Jun. 423.
Lagan. 677.
Laga skifte v. Reparceling of Land and Allotment.
Lagberg, J. O. 463.
Lagerbring, S. 446.
Lagerbäcks Fabriksaktiebolag. 881.
Lagerheim, G. 468.
Lagerhjelm, P. 862, 908.
Lagerlöf, Selma. 408.
Lagerman, A. 825, 862, 908.
Lagerstedt, Agnes. 1085.
—, N. V, 454.
Lagklarebäck. 546.
Lakes. 3, 11, 17, 36, 50, 57, 66, 95.
Lallerstedt, E. 415.
Lambs. 550, 551.
Lamm, C. 860.
—, S. L. 874.
Lampa, S. 472.
Lamps. 881.
Lamp-black. 861.
Lancashire Forging. 728—731.
Landberg, C. 444.
Landed Property Courts. 231.
Landergren, E. 460, 1080.
Landrail. 65.

Digitized by Google

Landskrona. 45, 106, 234, 372, 772, 807, 811, 931, 948.
— Nya Mekaniska Verkstad. 880.
Landstorm. 220.
Land Taxes. 207, 208.
Lange, L. 489.
Langley, S. P. 475.
Langlois, Charles. 434.
Language. 91, 92, 93, 166.
Lappland. 3, 4, 9, 13, 14, 27, 30, 33, 34, 38—40, 42, 44, 59, 93, 102, 134, 135, 153, 202, 361, 365, 389, 467, 488, 489, 500, 630, 673, 696, 697, 721, 845, 902, 983, 988.
— Bunting. 64.
»— Express». 988.
— Owl. 65.
Lapps. 70, 91, 93, 166, 167, 268, 270, 299, 359, 365, 391, 392, 449, 570.
Larceny. 151, 153.
Larch. 60.
L'Archevêque, P. 417.
Lars Hierta's Memorial Foundation. 297, 303, 305, 381, 1098, 1101, 1103, 1104.
Larson, Markus. 425.
Larsson, Carl. 331, 429, 430, 904.
—, H. 441.
Laths. 658, 664, 665.
Latitude. 2, 9, 24, 28.
Laurell, P. VII, VIII.
Laurin, C. G. 451.
de Laval, G. 577, 579, 581, 582, 583, 854, 862, 868, 879, 889, 890, 908.
— Separator Co. Ltd., The. 868.
Lavoisier, Ant. L. 478.
Law. 74, 170, 177, 179, 180, 181, 228, 436—438.
Lawes. 592.
Lawn-tennis. 372.
Lawyers. 229, 230.
Laxå. 980.
Lead. 41, 682, 753, 754, 755, 760.
Leander, P. J. H. 440.
Learned Societies. 378.
Leather. 810, 811, 926.
Leche, W. 472.
Leckö Castle. 411.
Lectors. 325, 326, 327.
Lecture Associations. 316, 317.
Lecturers. 335.
Leffler, Anne Charlotte. 407.
—, Johan. V, IX, 455, 457, 1080.
—, John. 733, 734.
Legacies. 279, 381. Cf Funds.
Legal Tender. 1021, 1022.
Legations. 186.
Legislation. 170, 176. See also special articles.
Leibniz, G. W. 438.
Lejonström. 642.
Leksand. 364.
Lemke, J. P. 422.
Lemming. 62.
Lemonades. 791.
Lena, Battle of. 74.
Length of Life. 125, 1107.
Lennander, K. G. 464.
Lenngren, Anna Maria. 87, 402.
Lenning, John. 795, 1098.
Lennmalm, Fr. 463.
Lenström, K. J. 450.
Leopold, K. G. af. 87, 402, 438, 452.
Leprosy. 240, 244.
Lernbo. 877.
Lesjöfors. 877.
Lessebo. 831.
Letters. 1004, 1005.
Letterstedt, J. 381, 1098.
Levanten (Factory). 809.
Level. 5.
Levertin, A. V, 463.
—, O. 407, 450, 451.
Levies. 214, 216, 220.
Lewenhaupt, A. L. 85.
Lewis, Thomas. 869.
Ley, H. 427.
Lias System. 45.
Libau. 833.
Liberty of Trade. 897, 900, 934, 935, 1050, 1067.
Libraries. 194, 235, 287, 298, 339, 383, 393, 394, 395, 396.
Licenses. 278, 279, 281.
Lichens. 53, 784.
Lidén, E. 444.
Lidforss, B. 470.
—, V. E. 444.
Lidholm, H. A. 573.
Lidköpings Mekaniska Verkstad. 880.
Lidner, B. 402.
Liebig, J. von. 479, 513, 591.
Life-saving Establishments. 961, 963, 964.
Lighters. 957.
Lighthouses. 34, 193, 508, 961—964.
Lighthouse and Beaconage-dues. 206, 207, 963.
Light-ships. 961, 963.
Liliencrantz, J. 454, 766, 899.
Liljedahl. 728, 845, 847.
Liljefors, B. 63, 67, 387, 430, 670, 672.
Liljegren, J. G. 442.
Liljeholm, G. 156.
Liljeholmen Stearine-Factory. 817, 818.
— Stubinfabrik. 892.
Liljeqvist, E. 440.
—, P. 881.
Liljewalch, E. 964.
Lilla Edet. 831, 880.
Lillefors. 887.
Lilliehöök, K. B. 486.
Lilljeborg, W. 471.
Lilljekvist, F. 414.
Lima. 11.
Lime. 16, 39, 44, 46, 56, 57, 845.
— (Linden). 17.
Limestone. 11, 19, 20, 42—44, 48, 835, 836.
Limhamn. 839, 861, 960.
Limmared. 845, 847.
Lind, Jenny. 433.
Lindahl, P. 434.
Lindberg. 964.
—, C. P. 734.
—, E. 420.
—, G. 420.
—, J. A. 420.
—, S. O. 468.
—, W. 874.
Lindblad, A. 432.
—, O. 431.
Lindeberg, A. 434.
—, K. J. 467.
Lindegren, Agi. 414, 415.
—, Amalia. 425.
Linderoth, G. W. 881, 886.
Linderödsåsen. 21.
Lindfors, A. O. 464.
Lindgren, A. V.
—, E. VI.
—, G. X, 409, 414.
—, Hj. O. 460.
Lindhagen, A. X, 338.
—, D. G. 483.
Lindholmen (Carpentry Factory). 828.
— (Mechanical Works). 224, 873, 879, 960.
Lindman, A. 427.
—, C. A. M. 469.
—, K. F. 481.
Lindormsnäs. 547.
Lindroth, L. 454.
Lindstedt, A. 484, 1073.
Linen. 804, 805, 922.
Lindsborg. 333.
Lindström, A. 581.
—, G. 471, 474.
—, I. 582, 583.
Ling. 676, 677.
Ling, Hj. 350.
—, P. H. 297, 348, 349, 350, 351, 352, 356, 404, 453.
Linköping. 24, 106, 218, 394, 409, 413, 948.
Linnæa. 55.
Linnæus, Carolus. 87, 96, 277, 339, 375, 401, 461, 462, 465, 466, 467, 470, 472, 475, 485, 489, 495, 539, 542, 591, 598.
Linnarsson, G. 473.
Linné, C. von, see Linnæus.
Linné Spring. 246.
Linnet. 65.
Linroth, K. 457, 461.

Digitized by Google

Linseed Cakes. 928, 929.
Liquors. 156, 276, 920, 921, 927.
List-ballots. 180.
Literature. 87, 398—408.
Lithographic Institutions. 894, 896.
— Joint-stock Company of Norrköping. 896.
— Printing-office of the General Staff. 896.
Litorina-sea. 50.
Liunggren, E. G. 203.
Liverpool. 974.
Live Stock. 508, 509, 516, 549, 550, 557, 796.
Livonia. 80, 81, 83, 85, 333.
Lizards. 61, 62.
Ljungan. 6, 657, 677.
Ljungberg, C. E. 457.
—, E. I. 713.
Ljungberger, G. 418.
Ljunggren, E. J. v.
—, G. 450, 452.
— Machine Factory. 880.
Ljungquist, S. 543.
Ljungström, B. 880, 908.
Ljusnan. 6, 15, 102, 657, 677.
Ljusne. 645.
Lobster. 674, 677.
Local Government. 195.
— Traffic. 994.
Loccenius, J. 437.
Locke, John. 452.
Lock-hospitals. 147, 240.
Lock-outs. 1066, 1067.
Locomotives. 869, 871, 872, 873, 874, 983.
Log-cabin. 643.
Log Transport. 644, 652.
Loka. 246.
Lomberg. 690.
Lomma. 46, 836, 837.
London. 24, 27, 354, 367, 372, 461, 553, 680, 890, 904, 974, 1020.
Longitude. 2, 28.
Loos, K. 489.
Loostrōm, L. 451.
Lord High Admiral. 191, 192.
— High Chancellor. 191, 192.
— High Steward. 191, 192.
— High Treasurer. 192.
— Marshal. 191, 192.
Lorén, V. E. 455, 1080.
— Foundation. 455, 614, 1080.
Lovén, Chr. 459, 460.
—, J. M. 480.
—, S. 471, 472, 473, 474, 490.
Lovisa Ulrika, Queen. 417.
Lubricants. 814.
Ludvigsberg Mechanical Works. 874, 880.
Ludvika. 888, 890, 980.
Lugnvik. 643.
Lugnås. 835.
Lule elf. 6, 7, 10, 12, 53, 54, 366, 677, 773, 983.
Luleå. 106, 108, 365, 366, 546, 603, 604, 694, 695, 948, 962.
Lumber-yard. 665.
Lunatic Asylums. 239, 240, 241, 339.
Lund. 2, 24, 26—28, 35, 45, 106, 108, 237, 242, 263, 268, 316, 326, 329, 333, 337—339, 348, 372, 378, 383—385, 431, 440, 441, 448, 457, 459, 462, 464, 471, 482—485, 548, 587, 598, 772, 795, 798, 811, 1103.
Lund, K. F. 678.
Lundal, A. 488.
Lundberg, G. 423.
—, J. T. 420.
—, R. VII.
Lundby. 873.
Lund Cathedral. 266, 268, 409, 413.
Lundegård, A. V. 408.
Lundell, J. A. 442, 449.
—, P. VI.
Lundeqvist, Gerda. 435.
Lundgren, B. 473.
—, C. IX.
—, E. 424.
—, L. 419.
—, R. IX.
Lundgren's High School Fund. 1098.
Lundin, C. Fr. IV.
Lundin's Tannery. 811.
Lund Private College. 329.
Lundqvist, C. F. 433.
—, G. 477.
Lundsbrunn. 246.
Lundstedt, B. V, 398.
Lundström, A. N. 470.
—, C. J. 881.
—, H. 436.
—, J. E. 823, 829, 908.
—, K. E. 481.
Lundvik, C. 734, 735.
Lunnevad. 313.
Luossavara. 12, 40, 687, 689, 691, 692, 695.
Luossavara-Kirunavara Company, Ltd. 695.
Luth & Rosén. 880, 890.
Lutheran Church. 260, 265.
Luther, Martin. 261, 262, 267.
Lübeck. 910, 911, 948, 974.
Lübke, Wilh. 451.
Lützen. 82.
Lyberg, G. A. IV.
Lying-in Hospitals. 242, 464.
Lynx. 64, 671.
Lysekil. 245, 363.
Lyttkens, I. A. 442, 454.
Långban. 687, 704.
Långbanshyttan Works. 679.
Långholmen. 234, 960.
Läffler, L. F. 443.
Län. 93, 95, 97, 98, 100, 102, 114—116, 121, 126—128, 131, 147, 148, 152, 192, 195, 201, 248, 259.
Längman, E. J. 382, 1098.
Längman's Donation Fund. 382, 1098.
Löfholmen. 861.
Löfling, P. 467, 489.
Löfström, S. A. 457.
Lönborg, S. 494.
Lönnberg, E. 472.
Lönngren, Frida. 905.
Löwegren, M. K. 464.

Macaroni. 778.
Machine Industry. 768, 862—886.
Machinery. 508, 509, 809, 869, 921, 923, 926, 927, 928, 929.
Mackerel. 677.
Maclean, R. 512.
Madrid. 27.
Magistrate. 195, 196, 252, 253.
Magnet, Electrical Co., Ltd. 888, 890.
Magnetite. 692.
Magnetometer. 698.
Magni, Johannes. 445.
—, Olaus. 445, 488, 580.
Magnus Ericsson, King. 75.
— Ladulås, King. 74, 76, 998.
Magpie. 62.
Mails. 1003.
Maize. 535, 928.
Malgomaj-Volgsjön. 11.
Mallard. 62, 673.
Malmberg, F. G. 486.
Malmberget. 103, 694.
Malme, G. A:son. 469.
Malmgren, H. 457.
Malmsjö, J. G. 885.
Malmsten, K. J. 481.
—, P. H. 462.
Malmström, B. E. 405, 452.
—, C. G. 447.
—, J. A. 425.
Malmö. 21, 106, 108, 179, 180, 224, 234, 259, 299, 318, 332, 346, 364, 372, 413, 419, 457, 554, 583, 585, 587, 694, 772, 777, 783, 789, 792, 798, 809, 811, 812, 817, 853, 866, 869, 880, 885, 888, 889, 890, 914, 919, 931, 944, 948, 951, 960, 962, 966, 980, 988, 995, 1002, 1006, 1009, 1011, 1022, 1033, 1044, 1099, 1107.
Malmöhus Län. 33, 93, 94, 98, 102, 114, 520, 521, 524, 528, 529, 531, 533, 536, 575, 601, 603, 641, 768, 770, 836, 979, 995, 1004, 1033, 1035, 1039.
Malmö Tidningen. 397.
Malt. 789, 791.
Malt Extract. 791.

Digitized by Google

Malt Liquors. 154, 156, 284 788, 789, 790.
— Tax. 791.
Manganese. 41, 682, 685.
Manhem Building Company, Ltd. 1087.
Manilla. 305, 307, 309.
Mankell, J. 447.
Manor-houses. 161, 162.
Manners and customs. 153.
Manufacturing Industries. 763.
Manures. 516, 607. Cf Fertilizers.
Maple. 17, 56, 57.
Maps. 193, 200, 367, 474, 698, 704, 705, 706, 896.
Marble. 38, 39, 40, 835, 836.
Marconi Wireless Telegraph Company. 890.
Mares. 553, 555.
Margaret of Denmark. 75, 76.
Margarine 516, 580, 778, 928, 1051.
Marieberg (Saw-mill). 643.
— (near Stockholm). 861.
Mariestad. 829, 831
Marine-Deposits. 14, 15, 16, 20, 21, 50
Marine Engineers. 225, 226
Marinoni. 894.
Maritime Law. 230, 231, 967.
Market Days. 934, 935.
Marking Trees. 636.
Markstedt, A. 642.
Marl. 19, 45, 46, 48.
Marma. 645.
Marriage Age. 119.
Marriages. 92, 96, 114, 115, 116, 117, 118, 119, 120, 150, 502
Marseille. 974.
Marstrand. 108, 245, 363, 948, 964.
Marten. 64, 671.
Martin 62.
Martin, A. 489.
—, E. 424.
—, F. 492, 493.
—, J. F. 424.
—, Roland. 458.
Masons. 348, 900.
Masreliez, J. A. 424.
Masts. 658.
Match-cord. 860.
Matches. 108, 639, 822, 825, 908, 924, 926.
Match-factories. 823, 824, 825, 826, 827, 1068.
Match-industry tools. 880.
Material Testing Institution. 809.
Mathematics. 480—482.
Mattisudden. 299.
Maupertius, P. L. M. 482.
Mauser System. 220.
Mausoleum of John Ericsson. 415, 909.
Mayor. 196, 230, 251, 253.
Mayr, G. von. 198, 199, 200.
Mead 569.
Meadows. 36, 56, 57, 497, 498, 520, 521, 539.
Measures. XI, 1061.
Meat. 156, 516, 563, 931.
Mebius, C. 477.
Mechanical Works. 500, 770, 862, 863, 864, 865—884, 1068.
Medelpad. 3, 4, 12, 14, 38, 135, 365, 645.
Medevi. 246.
Medical Service. 220, 237.
Medicine. 243, 273, 458, 459.
Medin, O. 463.
Mège-Mouriés, F. 778.
Meijtens, M. 422.
Mekanikus Co., Ltd. 880.
Melanderhjelm, D. 483.
Melbourne. 974.
Melin, H. M. 436.
—, K. A. 408, 452.
Mem. 934.
Mercantile Law. 231.
Merchant Navy. 508, 509, 942, 943, 944.
Merlin. 64.
Merrimac. 133.
Messenius, Johannes. 445.
Mesterton, K. B. 464.
Metal Industry. 768, 862—886.
Metals. 682, 684, 685, 752, 753, 920, 921, 923, 924, 927, 929, 945.
Meteorological Central Office. 376.
Meteorology. 484—488.
Methodists. 269, 271.
Metric System. XI, 1061.
Meyerbeer, G. 432.
Meyerson, Gerda. IX, 1102.
Mica-schist. 11, 38, 42, 44.
Michaëli, Louise. 433.
Michaëlson, J. 818.
Middle Age. 72, 95, 170, 171, 191, 253, 261, 317, 399, 415, 435, 910, 911.
Midnight Sun. 360, 365, 988.
Midsummer. 158.
Midwives. 237, 242, 464.
Mien, Lake. 47.
Migration, internal. 98, 114.
Migrants (Birds). 61.
Military Academy. 377, 378.
— Archives. 383.
— Education. 217.
— Science. 210, 212.
— Service. 74, 212, 214, 215.
— Tribunals. 231.
Milk. 156, 571, 572, 573, 574, 577, 578, 582, 604.
»Milkdrop, The.» 1099.
Milles, C. 420.
Millgearing. 880.
Mill-stones. 44, 46, 836.
Mine Legislation. 706.
Mineralogy. 472—474.
Minerals. 682, 684. 685, 752, 753, 920, 922, 923, 924, 927, 945.
Mineral Springs. 246.
— Waters. 791.
Mines. 40, 41, 225, 226, 508, 509, 690, 691, 693, 699, 700, 701, 1068.
Mining. 74, 500, 681, 682, 686, 697, 698, 699, 700, 701, 702, 703, 705, 768.
— Alidade. 705.
— Plain Table. 705.
— Schools. 762.
Minister for Foreign Affairs. 186, 187, 188.
Ministers. 178, 186, 188, 193, 196, 197.
Ministry. 172, 173, 175, 192.
Minnesota. 132.
Minor Workers. 1067, 1068, 1069.
Mint. 194, 1021.
Mirrors. 848.
Misdemeanours. 153.
Mission Union. 270.
— Work. 70, 270.
Mitscherlich, E. 821.
Mittag-Leffler, G. 481, 482.
Mixed Corn. 522, 524, 527, 528, 532.
— Schools. 329.
Mjölby. 980.
Mo. 643, 647, 649.
Moberg, J. Ch. 474.
Models. 1059, 1060.
Moeda. 879, 880, 881.
Moelfven. 657.
Mohn, F. M. 568.
Moisture. 33.
Molasses. 779, 783, 784, 785.
Mole. 65.
Molin, A. 489.
—, J. P. 418.
—, P. 408.
Molkom. 604.
Molluscs. 61.
Mon (Saw-mill). 645.
Monasteries. 73, 261, 267.
Monetary Unit. XI.
Money Orders. 1004, 1005.
Monitor. 133.
Montelius, Agda. IV.
—, O. 448, 465.
Montén, Lars. 816, 818.
Monvel. 434.
Moor-Association. 606, 607, 608. Cf Fen Culture Society.
Mora. 646, 980.
— Factory. 809.
Morals. 146.
Moresco Co., Ltd. 809.
Morgonposten. 397.

Digitized by Google

Morgårdshammar. 586, 880, 881.
Mormons. 269.
Mortality. 115, 123, 124, 125, 126, 127, 128, 1079.
Mortar. 839.
Mortgage. 598, 599, 601, 1032, 1033.
— Banks. 590, 599, 600, 1032, 1033.
— Societies. 599, 600.
Mosander, K. G. 460, 479.
Moscow. 1020.
Moss. 185.
Mosses. 20, 21, 53, 58, 848.
Moss-litter. 851.
Motala. 42, 103, 106, 108, 329, 364, 786, 881, 889, 960, 1091.
— Mechanical Works. 224, 872, 874, 875, 879, 985.
— Ström. 17, 954.
Mothers' Meetings. 1102.
Motorpathy Apparatus. 881.
Mountain Ash. 53, 56.
— Colonies. 298.
Mountains. 7, 9, 10, 11, 12, 500.
Movement of Population. 115.
Mowing-machines. 543, 880.
Mozart, Wolfg. A. 432.
Munck af Rosenschöld, E. Z. 462.
Munich. 427, 429, 488, 788.
Municipal Administration. 248.
— Finance. 250.
Munkedal. 831.
Munkfors. 646, 744.
Munksjö. 829, 831, 832.
Munksund. 642.
Munktell, J. T. 543, 874, 879, 880, 881, 884.
Munthe, H. 474.
Muonio (River). 2.
Murbeck, S. 469.
Murder. 151, 152.
Murray, A. 458.
Museums. 383—393.
Music. 409, 430—433.
Musical Instruments. 885.
Mute Swan. 66.
Mutton. 567.
Müller, Alex. 592.
—, E. 459.
—, J. B. 489.
München Brewery. 790.
Myrberg, O. F. 436.
Månsbo. 856, 888, 889.
Månsson, J. 961.
Mälaren, Lake. 17, 41, 48, 50, 68, 69, 70, 80, 84, 88, 95, 106, 161, 165, 204, 362, 363, 411, 954, 959, 995.
Möllenborg, G. 885, 907.
Möller, C. 415.
—, D. M. A. 483.
—, P. 493.
—, P. von. 593.
Mörner, C. T. 460.
—, K. A. H. 461, 480.
Mörrums å. 677.
Mörsil. 248.
Mösseberg. 245.

Nacka (near Stockholm). 32, 787.
— (Saw-mill). 645.
Næsman & C:o, E. A. 881.
Nails. 867, 902.
Names, geographical. 3.
Nansen, Fr. 378.
Naphthaline. 815.
Napoleon. 88, 89, 635.
Narvik. 687, 695, 980, 988.
Nathorst, A. 580.
—, A. G. 378, 469, 474, 491, 492.
—, Hj. 592.
—, J. T. 591.
National Costumes. 153, 154, 157, 158, 167.
— Debt. 174, 204, 206, 209, 210, 509.
— Debt Office. 174, 177, 194, 204, 205, 599, 1025.
— Evangelical Society. 269, 270, 974.
— Insurance Office. 1048, 1076, 1077.
— Museum. 383, 384, 385, 415, 420, 425, 428, 429.
— Order of Good Templars. 283.
— Record Office. 194, 382, 383.
— Wealth. 146, 502, 504, 507—510.
Natural History Museums. 376, 385, 386, 470, 471.
— Springs. 791. Cf Mineral Springs.
Nauckhoff, V. VI, VII, X, 592.
Naumann, Kr. 431.
Nautical Chart Office. 202, 204, 961.
Nautico-Meteorological Office. 486.
Naval Academy. 226.
— College. 226, 227.
— Department. 194, 225, 966.
— Stations. 225.
Navigation. 33, 34, 193, 500, 501, 941.
— Charts. 204.
— Schools. 193, 966, 967.
Navy. 214, 216, 222—228, 239, 962.
— General Staff. 225.
— Yard, The. 225, 226, 960.
Neck-tie Factories. 809.
Nectarines. 545.
Nehrman, D. 437.
Neology. 262.
Nepheline Syenite. 47.
Neptune Salvage Co. 964, 965.
Nerike. 3, 4, 16, 38, 39, 42, 43, 44, 48, 50, 135, 247, 562, 580, 902, 995.
Nerikes Allehanda. 397.
Nerman, G. VIII, 487.
Netherlands. 1, 123, 124, 125, 137, 147, 154, 301, 487, 529, 661, 663, 664, 697, 758, 911, 924, 925, 927, 929, 945, 947, 948, 949, 970, 977.
Netzel, W. 464.
New Church. 271, 272.
— Evangelism. 269.
Newspapers. 396, 397, 398, 1001, 1004, 1005.
New Sweden. 138, 489.
New York. 868, 1020.
Nickel. 682, 758.
Nightingale. 66.
Nightwork. 988, 1079.
Nilson, L. F. 479, 593.
Nilsson, A. III.
—, Karna. 904.
—, Kristina. 433.
—, N. Hj. VII, 593.
—, Sven. 339, 448, 470, 471, 473, 807.
Nipor see Bluffs.
Nissan. 677.
Nitroglycerine. 859.
Nobbe, Fr. 604.
Nobel, Alfred. 285, 378, 379, 479, 859, 908.
—, Imanuel. 378, 908.
—, L. I. 379, 813.
—, R. H. 379, 813.
— Foundation. 285, 340, 375, 378, 379, 380, 381, 420, 1097.
— Gunpowder. 860.
Nobility. 73, 74, 77, 82, 83, 84, 86, 88, 141, 142, 143, 144, 171, 173, 174, 175, 208, 615.
Nonnen, Edv. 591, 594.
Norberg. 687, 689, 690, 691, 700, 887.
Norberg, H. 427.
—, M. 442.
Nordblom, J. E. 432.
Norden (Insurance Company). 1048
Nordencrantz, A. 454, 761.
Nordenfeldt, T. 908.
Nordenflycht, H. Ch. 401.
Nordenskiöld, A. E. 378, 474, 487, 490, 491, 494.
—, G. 491, 494.
Nordenskjöld, O. 494.
Nordenson, E. 464.
Nordenström, O. G. VII.
Nordensvan, G. 451.
Nordewall, E. 862, 956.
Nordin, Fr. IV.
Nordingrå. 625, 630.
Nordiska Acetylenaktiebolaget. 881.
— Kompaniet. 905.

Digitized by Google

Nordiska Kreditbanken. 1031.
— Trävaruaktiebolaget. 642.
Nordisk Familjebok. 287.
— Tidskrift. 381.
Nordling, E. V. 438.
Nordmarken. 687, 691.
Nordpolen (Insurance Company). 1046.
Nordstedt, O. 468.
Nordstjernan (Insurance Company). 1046.
Nordström, C. 429.
Noreen, A. 443.
Noring, A. 560, 591.
Norlin, T. 436.
Norling, Sv. Ad. 598.
Norman, L. 433.
Nornan (Insurance Company). 1046.
Norra Blasieholmen Harbour. 942.
Norrahammar. 881.
Norrbotten, Län. 33, 93, 94, 98, 114, 121, 127, 202, 247, 497, 520, 521, 524, 528, 531, 570, 613, 621, 626, 629, 631, 632, 633, 641, 642, 670, 673, 692, 693, 770, 902, 995, 996.
— (Province). 3. 4, 14, 135, 672.
Norrköping. 103, 106, 108, 179, 180, 234, 259, 299, 346, 359, 428, 547, 764, 772, 789. 792, 795, 798, 799, 801, 831, 832, 853, 879, 880, 888, 889, 931, 948, 960, 962, 995, 1099, 1101, 1102, 1103, 1107.
Norrköpings Bomullsväfveriaktiebolag. 801.
— Tidningar. 397.
Norrland. 3, 4, 5, 16, 31, 32, 33, 39, 50, 64, 66, 92, 93, 98, 134, 147, 155, 201, 203, 232, 247, 253, 281, 315, 360, 365, 370, 374, 497, 518, 524, 539, 543, 556, 562, 563, 573, 620, 621, 625, 629, 637, 639, 646, 652, 661, 663, 664, 675, 866, 902, 911, 948, 954, 985, 996, 1090.
— (Insurance Company). 1044, 1046.
Norrmalm Classical College. 327, 413, 429, 430.
Norrman, C. 874.
Norrström. 17, 362.
Norrström, Hj. 907.
Norrsundet. 646.
Norsborg. 545.
Norsholm. 980.
Norstedt, Anna. 427.
—, P. A., & Söner. 893, 894, 895.
—, R. 427.
Norström, V. v, 440.
North America. 270, 382, 467, 494, 542. Cf America and United States.
North-East Passage. 490, 491.
Northern Company, Ltd. 905.
— Games, The. 373, 374, 375.
North Museum. 158, 387, 388, 389, 391, 392, 393, 414, 449, 495.
North Sea. 677, 947, 957, 959.
Norway. 1, 9, 23, 27, 28, 36, 69, 72, 74—76, 83, 89, 91, 96, 100, 102, 113, 114, 123, 124, 125, 128, 130, 143, 147, 154, 168, 175, 184—188, 198, 268, 274, 301, 312, 321, 354, 366, 374, 381, 389, 465, 487, 556, 557, 569, 570, 577, 604, 638, 646, 664, 665, 666, 676, 677, 687, 695, 754, 778, 787, 790, 794, 801, 816, 822, 842, 844, 902, 922, 924, 925, 927—930, 935, 946—949, 967, 968, 970, 977, 980, 1002, 1022.
Numismatics. 448, 449.
Nuremberg. 422.
Nursery-gardens. 547, 548.
Nut-hatch. 65.
Nya Dagligt Allehanda. 397.
Nya Kopparberg. 41.
Nya Varfvet. 234.
Nyberg, C. R. 881, 908.
Nyblæus, A. 440, 441.
Nyblom, C. R. v, 406, 450, 451, 452.
—, Helena. 408.
—, Sven. 433.
Nybom, J. 405.
Nyborg. 642.
Nyby. 881.
Nydala. 604.
Nydqvist & Holm. 872, 873.
Nykroppa. 708.
Nyköping. 24, 772, 882, 948.
Nyrén, M. 484.
Nyström, A. 315.
—, Elisabeth. 1103.
Nådhammar. 573.
Näfvekvarn. 542.
Näs (Saw-mill). 646.
Nässjö. 20, 21, 980.
Nääs (Spinning-mill). 801.
— Slöjdlärareseminarium. 301, 302, 1098.

Oak. 17, 51, 52, 56, 57.
Oats. 155, 514, 522, 524, 525, 527—529, 531—535, 551.
Obbola. 642.
Observatories. 2, 202, 339, 482—484, 486.
Obstetrics. 242, 464.
Ocean (Insurance Company). 1043.
Ocke. 643.
Ockelbo. 980.
Odelberg, W. 843.
Odelstierna. 745.
Oden (Insurance Company). 1046.
Odén, K. G. 457.
Odenius, M. V. 460, 461.
Odhner, C. Th. 447.
Odontology. 242.
Offences. 153.
Offerdal. 44.
Officers. 196, 216, 217, 219, 225, 226, 228.
Officials. 175, 178, 184, 196, 988, 1005, 1009.
Ofoten. 365, 695.
Oils. 768, 812—814, 920, 922, 926 - 929.
Oil Cake. 813.
Oktorp Farmyard. 155, 159.
Olai, Ericus. 445.
Olin, E. 434.
Olivecrona, Rosalie. 1104.
—, S. R. D. K. 438.
Ollman, E. A. 870.
Olof, King. 71.
Olofström. 586, 881.
Olsson, P. 472.
Omberg. 16, 633.
Omnibuses. 994.
Onions. 546.
»Onkel Adam». 405.
Open-air Museum. 389, 391, 392.
Operation Table. 244.
Oranges. 921.
Orchards. 545.
Order of Good Templars. 283.
Order of Templars. 283.
Orders of Knighthood. 168.
Ores. 38—41, 102, 682, 688, 697, 922, 946, 991.
Oresjön. 42.
Organic Law. 171, 172, 174, 176, 179, 180.
Orling, A. 908.
Ornäs cottage. 77, 410.
Orphanages. 256, 1098.
Orsa. 253, 577, 836, 980.
Orsasjön. 42.
Orthoceras. 43.
Orthognaths. 134.
Orthopedic Clinique. 311.
Ortviken. 645.
Orup. 594.
»Orvar Odd». 405.
Osbeck, P. 489.
Osby. 21, 845.
Oscar I. 89, 233, 913.
Oscar II. 89, 247, 363, 420, 428, 430, 493, 1105.
Oscar-Fredriksborg. 221.
Oskarshamn. 879, 889, 948, 960, 980.
Oskarshamns Mekaniska Verkstad. 879.
Oskarström. 806.
Osmund Iron. 716.
Osprey. 64.
Otter. 66, 671.

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Otter, C. G. von. 908, 964.
Outrage. 153.
Owen, Samuel. 766, 869.
Owl. 64, 65.
Own Homes. 1090.
Oxelösund. 694, 697, 963, 980, 983.
Oxen. 515, 551, 563.
Oxenstierna, Axel. 82, 83, 84, 86, 142, 162, 191, 412, 763, 764, 897, 911, 935.
Oyster. 674, 677.

Paganism. 69—72, 170.
Pagels, G. 493.
Paints. 920, 922, 926, 927.
Painting. 409, 421—430.
Palander af Vega, L. 378, 490.
Palestine. 467.
Palm, G. V. 425.
Palmcrantz, H. 543, 862, 908.
Palmcrantz & Co, Ltd. 880, 881.
Palme, B. A. 435.
Palmgren School. 329.
Palmroot, J. 441.
Palmstruch Bank. 598, 1024.
Paper. 768, 829, 832, 920, 923, 924, 926, 927.
Paper-currency. 1024—1028.
Paper Mills. 770, 829—832, 1068.
Parade. 211.
Parceling of Land. 511, 512.
Parcels. 1004, 1005.
Pardoning Power. 176.
Paris. 24, 372, 418, 419, 420, 423, 425, 426, 429, 457, 461, 598, 1020, 1061.
Paris, Gaston. 444.
Parishes. 73, 263, 265, 266.
Parish Libraries. 395.
Parks. 111, 547.
Parliament, see Riksdag.
Parliamentarism. 87, 172, 178.
Parochial Board. 249.
Parsnips. 546.
Partnerships. 1053.
Partridge. 65, 670, 672.
Pasch, G. E. 823, 908.
—, Lor. Jun. 423.
—, Lor. Sen. 423.
Pasteboard. 829, 831, 832.
Pasteurization Apparatuses. 576, 791.
Pastor Primarius. 263.
Pastures. 539, 541.
Patent and Registration Office. 194, 1055—1058.
Patents. 230, 1056, 1057.
Pathology. 461.
Pauli, G. 429.
—, Hanna. 429.
Paulinus Gothus, Laurentius. 262, 436, 453.
Paupers. 257.
Peaches. 545, 546.
Pears. 545.
Peasantry. 73, 77, 78, 86, 142, 143, 170, 171, 173, 174, 184.
Pease. 524, 528, 532, 546, 551.
Peat. 51, 668, 709, 713, 768, 806, 848, 850, 851.
Peat-bogs. 13, 14, 51, 54—57, 60, 66, 848.
Peat-coal. 709, 713, 850.
Peat Industry Machines. 880.
Peat-mould. 851.
Pebbles. 48.
Pedagogics. 453.
Peddling. 939, 940.
Pediatrics. 462, 463.
Pegmatite. 39.
Pehrsson-Bendz, O. 597.
Pellorippe. 10.
Penal Law. 233.
Pensions. 193, 196, 197, 205, 206, 218, 265, 292, 327, 332, 337, 397, 989, 1073, 1074, 1076, 1079, 1096.
Pension Funds. 1094—1097.
People's High-schools. 287, 312—317.
People's Libraries. 287, 395, 396.
People's Palace. 396, 415, 1064.
Perch. 678.
Percussion-caps. 860.
Peringer Lillieblad, G. 441.
Peringskiöld, J. 441, 445.
Periodicals. 397, 398, 436, 464, 470, 494, 1081, 1083.
Period of Freedom. See Era of Liberty.
Persberg. 687, 691, 751.
Pershyttan. 691.
Personal Taxes. 207.
Personne, N. 435.
Persson, P. 444.
—, Per. 809, 862, 880.
Perstorp. 787.
Pestalozzi, J. H. 453.
Peterson, A. 414.
—, L. 415.
Peterson-Berger, V. 432.
Petersson, O. V. 463.
Petri, Laurentius. 435.
—, Olaus. 81, 261, 262, 400, 435, 445.
Petrini, E. 452.
Petroleum. 813, 922, 928, 929.
— Machines. 880.
Petroleum-stoves. 879.
Petterson, V. 203.
Pettersson, S. O. 480, 486, 487, 495.
Pharmaceutical Institute. 243.
Pharmacology. 461.
Philadelphia. 457.
Philadelphian System see Cell System.
Philip and Son. 367.
Philology. 441—444.
Philosophy. 438 - 441.
Phosphate. 856.
Phosphorus. 688, 823, 825, 1067, 1070.
Phototype Printeries. 896.
Phragmén, E. 482.
Physicians. 237, 239.
Physics. 475—477.
Physiology. 460.
Piehl, K. 444.
Pietism. 268, 288.
Pig Iron. 706—709, 713—725, 727, 929.
Pigs. 514, 550, 551, 557, 568, 580, 581.
Pig Slaughter-houses. 793.
Pike. 678.
Pilo, K. G. 423.
Pilot Service. 193, 194, 961—964, 971, 974.
Pine. 12, 14, 16, 19, 21, 54, 55, 60, 632, 633.
Pipes. 867, 923.
Pitch. 667, 814.
Pitch-forks. 544.
Pite elf. 6, 10, 54.
Piteå. 24, 948.
Pitprops. 658, 661, 663 - 665.
Plaice. 676.
Planing-mills. 642, 661, 1068.
Plaster. 839.
Platen, B. von. 956.
Plates. 751.
Plate-vessels. 867.
Playing-cards. 832.
Ploughs. 541, 542, 867.
Plover. 62, 66.
Plums. 545, 921.
Poachard. 670, 673.
Poetry see Literature.
Polecat. 65.
Polhem, K. 85, 542, 862, 909, 956.
Police-Courts. 229.
Political Economy. 454, 455.
Pomerania. 83, 85, 89, 138, 333.
Pomology. 545.
Pontin, M. M. af. 479.
Poor-farms. 255, 256.
Poor-Houses. 255.
Poor Law. 193, 232, 234, 254.
— Relief. 251, 253—259.
Poplar. 224.
Population. 1, 3, 23, 68, 91—93, 95—98, 100, 102—106, 108, 110—115, 118, 123, 124, 126, 128—130, 132, 134, 182, 498, 1107.
Porat, C. O. von. 472.
Porcelain Factories. 39, 841—844.
Pork. 516, 563, 568, 924, 926, 928, 931.

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Porla. 246, 791.
Porphyry. 36, 37, 39, 835, 836.
Porpoise. 67.
Porsi Rapids. 7.
Portable Engines. 879.
Porter. 284, 788, 789.
Portland Cement. 46, 837.
Ports. 913, 919, 931, 944, 948.
Portugal. 113, 151, 911.
Post, H. von. 474, 480, 592, 806.
Postal Service. 274, 1001—1006.
Post- och Inrikes Tidningar. 375, 396, 397.
Post Offices. 194, 197, 208, 1000, 1002, 1003.
Post Office Savings Bank. 194, 236, 1005, 1035—1037.
Potash. 668.
Potassium-nitrate. 859.
Potatoes. 154, 156, 528, 529, 531, 537, 538, 551, 778, 784.
Potato-flour. 777.
Potstone. 836.
Pottery. 837, 840—843, 907.
Poughkeepsie. 868.
Poultry. 568, 569.
Precambrian System. 36, 37, 41, 42.
Precht, B. 416.
Precipitation. 33, 34.
Preserves. 793, 929.
Press-Law. 174, 196, 397, 940.
Press, Liberty of. 174, 196, 230, 231, 397.
Prices. 502, 514, 535, 537, 583, 584, 666, 778.
Prime Minister. 175, 178, 188, 193, 197.
Primitive System. 36.
Printed Goods. 804.
Printing-offices. 892, 893, 894, 1068.
Prison Labour. 236.
Prisons. 233—236, 239.
Private Banks. 1025, 1026, 1029, 1030, 1037, 1038.
Private Colleges. 329.
Private Railways. 977, 978, 980, 986, 989, 991.
Private Schools. 330.
Prize-competitions. 561.
Procuracy. 1056.
Professional Schools. 348.
Professions. 498.
Projectiles. 867, 881.
Property, landed. 145, 503, 504. 507, 509, 601.
Property, real. 145, 503—507, 509, 601.
Prosperin, E. 483.
Prostitution. 147.
Protectionism. 514, 929.
Protection of Animals. 285.
Protection of Workmen. 1052, 1067—1072.
»Protectors of the Realm». 74, 77, 171.
Protestantism. 260, 262.
Provinces. 3, 4, 69, 93.
Provincial Physicians. 239.
Prussia. 85, 321.
Przevaljskij, N. 378.
Ptarmigan. 61, 62, 670, 672, 673.
Public Buildings. 251, 252.
Public Buildings' Office. 194.
Public Forests. 621.
Public Health. 193, 243.
Public-houses. 278—280.
Puddling. 732.
Pudrette. 857.
Pufendorf, S. von. 85, 437, 445.
Pukeberg. 847.
Pulkova. 483, 484.
Pulp-wood. 621, 664.
Pulse. 522, 524, 527, 528.
Punch. 156, 786.
Påhlman Brothers. 938.
Pålsboda. 980.
Pårtefjällen. 10.
Pärk. 372, 373.

Quarantine. 245.
Quarken. 16, 33.
Quarries. 39, 44, 46, 834—836, 1068.
Quarternary deposits. 36, 45, 47, 48.
Quartz. 39, 688.
Quartzite. 11, 42.
Quennerstedt, A. W. 472.
Quensel, U. 461.
Qvarnström, K. G. 418.

Rabenius, L. G. 455.
Racing. 368, 373, 555.
Radiators. 579, 580, 581, 586, 880.
Radishes. 546.
Rafters. 652, 658, 661, 663—665.
Rahm, N. VII, IX.
Rails. 751, 923, 982.
Railways. 209, 366, 508, 548, 936, 976—993.
—, Electric. 888.
Railway Accidents. 992.
— Bridges. 982.
— Companies. 1054.
— Council. 986.
— Engines. 867, 879.
— Finances. 989, 990, 992, 993.
— Tariff. 985—988.
— Traffic. 989—991.
Rain. 33—36.
Raisins. 921.
Rakes. 544, 881.
Ramlösa. 246.
Ramm, A. IX.
Ramstedt, V. VI.
Ramus, P. 453.
Ranft, A. 435.
Rape. 153.
Rape-seed. 541.
Raphael, A. VII, VIII, IX, 455, 1066.
Rapids. 7, 361.
Rapid Mechanical Works. 880.
Rappe, Thorborg. IV.
Rask, R. Kr. 442.
Rasmussen, Y. 415.
Raspberries. 546, 788.
Raven. 66.
Razor-bill. 66.
Red-beets. 546.
Redbreast. 64.
Red Cross Home. 243.
Red Deer. 65.
Reddle. 861.
Redpoll. 64.
Redstart. 62.
Reduction (of the Crown lands). 84, 143.
Redwing. 64.
Redwood. 638, 660. Cf Pine.
Reed. 57.
Reeds. 902.
Reformation. 79, 80, 81, 142, 171, 249, 261, 262, 317, 400, 410, 435.
Reformed Church. 266, 269.
Regency. 175, 185.
Register Measurement. 970, 971.
Registers of Population. 198, 265, 383.
Register of Trade. 1055, 1056,
Regnell, A. F. 460, 469, 493.
Rehnström, W. 581.
Reijmyra. 845, 847, 848, 906.
Reindeer. 167, 359, 549, 570.
Reindeer-moss. 55, 58.
Re-insurance. 1049.
Religion. 260—272.
Religious Congress. 271.
Religious Liberty. 266, 267.
Religious Science Congress. 271.
Remmene. 568
Rennerfelt. 790.
Renström Fund. 382, 937, 1098.
—, Sven. 382, 937, 1098.
Re-parceling of Land. 511, 512.
Reptiles. 62.
Retail-trade. 278, 281.
Retzius, A. 134, 459, 461, 465, 472.
—, A. J. 461, 470, 591.
—, Anna Hierta-. IX, 297, 303, 305, 1101.
—, G. IV, V, VI, 135, 459, 460, 465, 472.

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Reuterdahl, H. 436.
Reymersholm. 786.
Rhætic-lias System. 21, 36, 37, 45, 46.
Ribbing, Seved. 463.
—, Sigurd. 439, 440.
Ribbons. 808, 809.
Ribe, K. Fr. 464.
Richert, J. G. 438.
Richthofen, F. von. 378.
Riddarhyttan. 687, 690, 691, 754, 758.
Riding. 368, 373, 555.
Riego, J. 435.
Rietz, J. E. 442.
Rifle-clubs. 221.
Rifles. 220, 867, 881, 884.
Riga. 81, 912.
Riksförsäkringsanstalten see National Insurance Office.
Riksdag (Diet, Parliament). 72, 77, 85, 86, 90, 142, 143, 145, 171—176, 178, 179, 183, 184, 185, 188, 192, 194, 196, 204, 206, 286, 393.
Ring-dove. 65.
Ring-ouzel. 64.
Ringsjön. 22, 46.
Rinman, L. 744.
Rinman, S. 862, 909.
Riseberga. 580.
Rising, J. 454.
Risingh, J. 543.
Rista Falls. 364.
Ritschl, Albr. 436.
Rivers. 6, 9, 36, 66, 653.
Roach. 678.
Road and Canal Office. 194.
Roberg, L. 458.
Robert Dickson's Institute. 1088, 1098.
Robertsfors. 642, 888.
Robbery. 153.
Rochdale System. 1083.
Rock Island. 270, 333.
Rockström. 791.
Rodhe, G. E. x, 444.
Roe. 65, 670, 672.
Roeskilde. 83.
Rollers. 542.
Rolling-stock. 983—985.
Roma. 567, 796.
Roman, J. H. 431.
Roman Catholic Church. 73, 261, 270.
Rome. 27, 417, 418, 419, 422, 424, 425, 427, 429, 488.
Romeleklint. 21, 23, 45.
Ronneby. 246, 364, 791, 889, 948.
Rook. 65.
Roos, A. W. 1002.
Root Crops. 515, 521, 537, 538, 539, 551.
Rosen, A. E. von. 976.
—, G. von. 427, 440, 491.
Rosén, L. 487.
Rosén, P. G. 483.
Rosenberg, C. 455.
—, E. 427.
—, J. O. 480.
Rosendahl, K. V. 461.
Rosenfeldt, Hans. 416.
Rosenfors. 881.
Rosenius, K. O. 269.
Rosenlund. 801.
Rosén-Rosenblad, E. 462.
Rosén von Rosenstein, N. 462, 463.
Roslagen. 70, 410, 954.
Roslag Sloop. 953, 954.
Roslin, A. 423.
Rossander, K. J. 464.
Rostius, Kr. 462.
Rotation of Crops. 515, 539.
Rotator. 586.
Rothlieb, Molly. 904.
Rotterdam. 694.
Rottneros. 880, 881.
Roumania. 301, 529.
Round Timber. 665.
Rousseau, J. J. 402, 452.
Routes for Sweden. 975.
Rowing. 372.
Row-boats. 902.
Roxen. 42.
Royal Academy of Agriculture. 300, 376, 377, 517, 542, 547, 548, 589, 593, 604.
Royal Academy of Fine Arts. 273, 377, 417, 423.
— Academy of Literature, History, and Antiquities. 376, 393, 443, 448.
— Academy of Music. 273, 378.
— Academy of Sciences. 341, 375, 379, 385, 393, 476, 543, 585, 765.
— Armoury. 384.
— Arms. 168.
— Library. 393, 394, 414.
— Military Academy. 377, 378.
— Opera. 429, 431, 435.
— Opera-house. 414.
— Palace, The. 169, 175, 412, 416, 417, 427, 1006.
Rubber. 768, 815, 816, 920, 922, 929.
Rubenson, A. 433.
—, M. 457.
—, R. 485, 486, 488.
Rubin, T. 492.
Ruckman, Maria Kristina. 434.
Rudbeck, O. Jun. 466, 470, 488, 494.
—, O. Sen. 85, 339, 400, 445, 448, 458, 462, 466, 470.
Rudbeckius, Johannes. 262, 319, 436, 453, 458.
—, P. 458.
Rudberg, F. 475.
Rudelius and Boklund. 587.
Rudenschöld, T. 288, 453.
Rudin, V. 436.
Ruins. 163, 363, 364, 409, 410.
Runborg, C. iv.
Rundgren, V. 270.
Rundvik. 642.
Runeberg, J. L. 404, 406.
Runes. 69, 91, 399, 441, 443.
Ruotivare. 38, 40, 687, 691.
Rural Districts. 100, 101, 103, 114, 128, 195, 229, 772.
— Population. 103, 105, 106.
Rurik. 70.
Russia. 1, 31, 36, 70, 75, 81, 85, 88, 102, 123, 124, 130, 137, 154, 155, 166, 173, 222, 301, 333, 356, 389, 487, 529, 551, 569, 620, 638, 692, 693, 694, 715, 750, 813, 814, 825, 837, 839, 842, 848, 890, 910, 912, 921, 924, 925, 927, 929, 930, 947, 948, 977, 1020.
Ruuthsbo. 580.
Rydberg, G. 425.
—, J. R. 477.
—, O. S. 447.
—, V. 405, 406, 436, 441, 451, 452.
Rydboholm. 801, 804.
Rydelius, A. 436, 438.
Rydin, H. L. 447.
Rydqvist, J. E. 442.
Rye. 154, 155, 156, 502, 522, 524—533, 535, 551, 777, 926, 929.
Ryllshyttę. 704.
Rålamb, Å. 590.
Råne elf. 14.
Råshult. 466.
Rättvik. 59, 154, 364, 368, 987.
Rävåla. 704.
Rääf, L. F. 449.
Röhss, W. 382, 1098.
Röhss Fund. 382, 1098.
Rörek. 70.
Rörstrand. 39, 837, 842—844, 906, 1085.
Röråa. 28, 754.

Sabbatsberg. 243, 248, 339.
Saggat-Skalka. 11.
Sago. 778.
Sahlin, C. Y. 440, 441.
Sahlstedt, A. 442.
Sahlström Manufactory. 806.
Sailing. 363, 371, 372.
Sailing Vessels. 943—947, 949.
Sailors. 226, 227, 972—974, 1095, 1105.
Sailors' Homes. 974, 1105.
Sailors' Mission. 270, 974, 1105.
Sala. 41, 704, 760.

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Salaries, Officials'. 196, 197.
Sale of Spirits. 278—282, 284.
Salenius, E. G. N. 579, 586, 879, 909.
Salin, M. 464.
Salmon. 359, 363, 365, 674, 677, 678.
Salmson, H. 427.
Saloman, G. 425.
Salomon, Otto. 301, 454.
Salt. 752, 922.
Saltpeter. 752.
Saltsjöbaden. 164, 165, 369, 371, 983.
Saltsjökvarn. 777.
Salubrine. 861.
Salvage Work. 964—966.
Salvation Army. 269.
Sanatoriums. 247, 248, 1098.
Sandahl, O. T. 461.
Sandarne. 645.
Sandberg, K. G. 424.
Sand-dunes. 20, 22.
Sandell, Lina. 435.
Sander, Fr. 450.
Sandhamn. 362, 371.
Sandpiper. 62.
Sandstone. 41—45, 835, 836.
Sandström, Anna. 453, 454.
—, I. 458.
—, J. V. 486.
Sandvik. 642.
Sandviken (Iron Works). 735, 736, 738, 877, 881, 887, 888, 1089.
— (Saw-mill). 643.
Sandö. 643, 845, 847.
San Francisco. 472, 1020.
Santesson, C. G. VI, 460, 461.
—, K. G. 464.
Sardines. 676.
Sarjeksfjällen. 9, 10.
Sarjektjäcko. 10, 11.
Sassnitz. 366, 947, 980, 1004.
Sausage. 516, 563.
Savings Banks. 1033—1040.
Saw-blades. 881.
Saw-frame. 650.
Saw-mills. 637, 638, 640—647, 649, 656, 662, 770, 1068.
Saxviken. 646.
Scandinavia. 1, 68, 381, 399.
Scandinavism. 89, 90.
Scania see Skåne.
Scarlet-fever. 244.
Scents. 817.
Schartau, Frans. 936.
—, H. 268, 436.
Schéele, F. von. 440, 452.
Scheele, K. V. 87, 401, 477, 478.
Scheffel, J. H. 423.
Scheffer, H. T. 477.
—, K. F. 454.
Schefferus, J. 441, 445, 449.
Schelling, Fr. W. J. von. 403, 438, 439.
Schenson, E. 809.
Schiller, Fr. 404.
Schisshyttan. 723.
Schist. 11, 19, 835, 836.
Schjellerup. 483.
Schleswig. 91.
Schlyter, K. J. 438, 442.
Scholander, F. V. 413, 425.
Schools. 144, 227, 286, 306, 307, 308, 310, 311, 320.
School-baths. 297, 298.
School Boards. 265, 274, 289, 292, 293, 299.
School Gardens. 548.
— Hygiene. 297.
— Kitchens. 295—297, 305, 382.
Schoolships. 224.
Schrevelius, F. G. G. 438.
Schröder, G. 423.
—, K. 416.
Schuldheis, G. IV.
Schultz, H. 483.
Schultzberg, A. 428.
Schulzenheim, D. von. 464.
Schück, H. V, 447, 450.
Schweinfurth, G. 378.
Schwerin, H. H. von. 493.
Schönberg, A. 446.
Schönherr, K. J. 472.
Science. 87, 435.
Scientific Colleges. 321, 326, 327.
Scientific Travels. 488—496.
Scissors Factory. 884.
Scorel, Jan van. 421.
Scotland. 5, 113, 123, 124, 147, 301, 543.
Sculpture. 409, 415—420.
Scythes. 542.
Sea Eagle. 66.
Seals. 66, 671.
Sea-level. 8, 9, 11, 17, 51.
Seamen. 226, 227, 972—974, 1095, 1105.
Seamen's Register Offices. 214, 973.
Seaside-places. 246.
Seasons. 27, 28, 30, 31.
Sea-vegetation. 58, 59.
Sebastine. 859.
Secretaries of State. 192.
Secret Committee. 86, 173.
Sects. 269.
Securitas. 1049.
Sedge. 14, 53, 54, 57, 58.
Sederholm, J. J. 15.
Sedlmayr, G. 788.
See. 881.
Seed. 525, 526, 535, 539, 546, 603—606, 779, 926.
Seed Breeding Association. 517, 606.
Seed-sorters. 544.
Seffle Canal. 956, 957.
Sefström, N. G. 473, 479.
Sehlstedt, Elias. 405.
Selander, E. 461.
—, N. 203.
—, N. H. 483.
Self-Government. 248, 259.
Sellergren, G. VII.
Semaphores. 1006.
Seminaries (for Teachers). 291, 292, 299, 548.
Separators. 575—578, 586, 880, 923.
Separator Company, Ltd. 582, 586. 587, 868, 880, 888.
Seraphim Hospital. 238, 462.
Serffjället. 11.
Sergel, J. T. 87, 417, 418.
Serine. 581.
Sernander, R. 469.
Servants. 157, 610, 614, 1063.
Servia. 123, 137, 301.
Settlement, Act of. 174.
Seve-group. 42.
Sevenbom, J. 424.
Sewing Factories. 809.
Sewing Machines. 809, 867, 872, 880.
Sex. 112—115, 117—119, 125, 128—130, 149, 151.
Shales. 45, 46.
Sheating-paper. 829, 831.
Shebeening. 279.
Sheep. 541, 550, 551, 557, 561, 566, 567.
Sheffield. 883.
Sheldrake. 62.
Shelter Forests. 632.
Shetland Islands. 677.
Shipbuilding. 951.
Shipping see Navigation.
— Dues. 970.
Shipyards. 869, 1068.
Shoddy. 799, 800, 926.
Shoe Factories. 810, 812.
Shoes, leather. 902.
—, wooden. 829, 902.
Shoemakers. 900.
Shooting. 373, 501, 669.
Shore-lark. 64.
Shovels. 544, 881.
Shrew. 62.
Sick-Nurses. 243, 259, 274.
Sick-relief Funds. 1091—1093.
Sidenbladh, E. IV, 457, 528, 531.
—, K. 457.
Siefvert & Fornander. 880.
Siemens-Martin Process. 744—750.
Sievert, Max. 892.
Sieves. 902.
Sigfrid. 74.
Sigismund. 262, 430.
»Sigurd». 408.
Sikeå. 888.
Silesia. 694, 796.
Silfverstolpe, C. 447.
Siljan. 42, 50, 677, 980.
Siljeström, P. A. 395, 453, 476.

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Silk Industry. 807, 808.
Silkworms. 807.
Silurian System. 21, 36, 37, 42—45.
Silver. 41, 682, 753, 754, 755, 760, 884, 885, 1021, 1022, 1023, 1059.
— Fir. 60.
Simrishamn. 811, 948.
Siskin. 64.
Sjangeli. 40.
Sjöassuranskompaniet. 1043.
Sjöberg, E. 403.
—, G. 454.
Sjögren, A. 473.
—, E. 432, 433.
—. Hj. 474, 493.
—, O. 447.
Sjöquist, J. 461.
Sjöstedt, Y. 471.
Sjöström, A. 593.
—, Maria. 904.
Sjötorp. 960.
Skabersjö. 890.
Skagerack. 1, 67, 204, 953.
Skagern. 54.
Skandia (Insurance Company). 1044, 1046.
Skandinavien (Insurance Company). 1048, 1049.
Skandinaviska Järnsängsfabriken. 881.
— Kreatursförsäkringsbolaget. 1049.
Skansen. 155, 159, 387, 389—392, 449, 570.
Skara. 24, 323, 409, 413, 416, 597, 598, 603.
Skaraborg Län. 33, 94, 98, 114, 115, 126, 127, 148, 202, 521, 524, 525, 528, 531, 564, 575, 641, 770, 845.
Skate-sailing. 369, 370, 374.
Skating. 368, 369, 374.
Skelderviken. 21, 45, 61.
Skellefte elf. 6, 10, 54, 657.
Skellefteå. 948.
Skeninge. 42, 73, 141, 261.
Skidrunning. 215, 368, 370, 374.
Skins. 768, 810, 811, 928.
Skoglund. 860.
Skokloster Palace. 84, 162, 412.
Skromberga. 45, 841, 845.
Skrubba. 312.
Skråmfors. 887.
Skua. 62.
Skulls. 134, 166, 465.
Skultuna. 586, 757, 877.
Skuorka. 10.
Skuru Straits, The. 18.
Skutskär. 645, 757.
Skylark. 65.
Skytte, J. 453.
Skånberg, K. 427.
Skåne. 3, 4, 5, 19—23, 31, 34, 36, 40, 42—48, 50, 58, 59, 61, 65, 66, 68, 70, 74, 75, 83, 85, 92, 102, 108, 135, 154, 158, 160—163, 204, 230, 232, 281, 313, 315, 409, 410, 497, 500, 512, 514, 515, 517, 523, 524, 526, 538, 541, 545, 548, 551, 554, 556, 559—563, 568, 569, 575, 580, 614, 615, 672, 675—677, 679, 702, 776, 779, 784, 789, 792, 796, 812, 836, 843, 845, 866, 902, 904, 934, 984, 1004.
Skåne (Insurance Company). 1044, 1046.
Skåne Cement Company. 839.
Skånska Dagbladet. 397.
Skärgård see Archipelago.
Sköfde. 42, 218, 310, 880.
Sköfde Mekaniska Verkstad. 880.
Sköldberg, S. 464.
Skönvik. 644.
Sköttgrufvan. 691.
Slate. 40—42, 836.
Sledge-kicking. 370, 374.
Sleepers. 658, 664, 665, 982.
Slips. 960.
Slip-docks. 869, 873.
Slottsmöllan. 799, 800.
Slottsskogsparken. 111.
Sloyd. 291, 294, 295, 297, 300—304, 307, 314, 332, 454, 803, 902.
Slätbaken. 956.
Small-beer. 284, 788, 789.
Smallherring. 67, 674—676.
Small-pox. 244, 246.
Smedman Commercial Schools. 938.
Smith, Adam. 454, 455.
Smiths. 900.
—, E. VIII.
—, W. 428.
Smitt, F. A. 471.
Småland. 3, 4, 5, 18, 20, 23, 38, 39, 47, 64, 81, 92, 102, 135, 204, 247, 281, 392, 421, 497, 541, 559, 612, 614, 620, 685, 688, 804, 836, 881.
»Smörgåsbord». 155, 367.
Snakes. 61, 62.
Snipes. 62, 670, 673.
Snoilsky, C. 406.
Snow. 31—35.
Snow-bunting. 64.
Snowdrop, The. 419.
Snow-shoes. 215, 368, 902.
Snuff. 156, 792.
Snäcke Canal. 956.
Soap. 816.
Social Conditions. 141.
Socialdemokraten. 397.
Social Statistics. 198, 457, 1078—1081.
Sociology. 455.
Sohlman, A. 450.
Solander, D. 489.
Solander, E. 477, 487.
—, I. H. 452.
Soldiers. 211, 213, 215, 217.
Sole. 676.
Solger, K. W. S. 452.
Solicitor General. 178, 179, 194, 196.
Solingen. 883.
Sollefteå. 365.
Sondén, P. 447.
Sonfjället. 11.
Songthrush. 64.
Sophia Hospital. 241, 243.
Sophia Spring. 246.
Sound, The (Öresund). 1, 22, 30, 32, 50, 67, 68, 69, 75, 108, 675, 933, 946, 948, 980, 1006.
South Africa. 467, 661.
— America. 493.
— Brazil. 469.
— Carolina. 856.
— Company. 911.
— Dakota. 132.
South-Kensington Museum. 904.
Sowing-Machines. 542, 880.
Sowing-seed Society see Seed Breeding Association.
Spain. 1, 147, 154, 261, 301, 425, 467, 529, 692, 693, 694, 825, 911, 921, 930, 977.
Sparfvenfeldt, G. 441.
Sparrman, A. 489.
Sparrow-hawk. 64.
Spars. 658, 667.
Speaker. 183.
Spegel, Hakvin. 262.
Spexeryd. 41.
Sphagnum. 14, 54, 55.
Spiegel-eisen. 723.
Spinning Mills. 770, 796, 798, 1068.
Spirit Distilleries. 770, 784, 786.
Spirits. 150, 154, 156, 207, 276, 278, 284, 537, 538, 770, 785, 786, 931.
Spitzbergen. 5, 48, 474, 487, 488, 490, 492.
Spohr, Ludw. 432.
Spole, A. 488.
Sport. 367—375.
Sport Park, The. 371, 372.
Sprat. 676.
Spruce. 12, 14, 16, 21, 54—56, 58, 60. Cf Whitewood.
Sprängsviken. 643.
Squirrel. 62.
Stabbarp. 841.
Stadling, J. 492.
Staff College. 217.
Stag. 65, 670, 672.
Stagnelius, E. J. 403.
Stallions. 553, 554, 555.
Stamp Duties. 207, 208.
Stangenberg, A. 464.

Digitized by Google

Stanley, H. M. 378.
Staple Towns. 911, 935.
Starch. 777, 778.
Stataresee Tenement-labourers.
State Calendar. 375.
State Expenditure. 205, 206, 328.
— Experimental School. 319, 320, 322.
— Minister. 186, 188.
— Normal School for Girls. 329, 330, 332, 1101.
— Railways. 206, 207, 239, 888, 977, 978, 980, 983—985, 988—991.
— Revenues. 206—208.
— Telephone. 207, 1010—1015.
Station Buildings. 983.
Statistical Tables' Commission. 197, 198.
Statistics. 87, 193, 197, 232, 257, 456, 457, 603, 775, 917, 928, 1078.
— of Population. 456.
Statistique Internationale. 457.
Stavanger. 5.
Stave, E. 436.
Stavenow, L. 447.
Staves. 658, 664, 665.
Steam-boat Lines. 947, 948.
Steam boilers. 867.
— engines 880.
— engine, Rotatory. 881.
Steamers. 224, 367, 879, 929, 936, 943—947, 950, 957, 994.
Steam Hammer. 736.
Steel. 708, 732—752, 924, 926, 929, 991.
Steele, Rich. 401.
Steel Factories. 770.
— Goods. 928, 1059.
Steers. 551.
Steffen, G. 455, 1080.
—, R. v.
Steffenburg Mine. 754.
Stella. 1049.
Stenbeck, T. 463.
Stenberg, S. 461, 784.
Stenbock, M. 85.
Stenborg, P. 434.
Stenfors. 881.
Stenhammar, W. 432, 433.
Stenkil. 73.
Stenman, Aug. 881.
—, F. A. 881.
Stensborg. 642.
Stensele. 24.
Stensholm. 880.
Stenshufvud. 21.
Sten Sture. Jun. 77, 78.
Sten Sture. Sen. 78, 415.
Stephan. 74.
Stephenson, G. 977.
St. Erik. 73.
St. Erik Building Company, Ltd. 1087.
Stettin. 694.
Stiernhielm, G. 85, 400, 441.
Stiernhöök, J. 85, 437.
Stiernman, A. A. von. 446.
Stiernstedt, A. V. 449.
Still-births. 122, 147, 149, 150.
Stille, A. 244, 885, 909.
Stipend Funds. 340—342, 344, 345, 347.
Stjernsund. 562.
Stobæus, K. 472.
Stock-dove. 65.
Stockholm. 2, 3, 16—18, 24, 26—28, 30, 35, 48, 78, 81, 82, 90, 93, 94, 98, 99, 103, 105—109, 114, 116, 126—128, 134, 135, 147, 148, 150, 152, 155, 158, 159, 163, 165, 179, 180, 186, 195, 196, 200, 218, 221, 222, 224—227, 230, 234, 237, 238, 241, 242, 247—249, 252, 256, 259, 262, 263, 266, 268, 271, 280, 281, 285, 288, 290, 294, 296, 298, 299, 303—305, 307, 309—312, 316—318, 320—322, 326—329, 333, 338—343, 347, 356, 358—360, 362—364, 366, 369—373, 375, 377, 378, 381—384, 386—390, 392—398, 401, 411—420, 422, 429—431, 446, 449, 457, 458, 460—462, 466, 469, 470, 472, 480, 482—485, 546—548, 570, 587, 597, 598, 634, 667, 694, 762, 766, 770, 772, 777, 787, 789, 790, 792, 795, 798, 809, 811, 828, 832, 833, 836, 853, 866, 869, 871, 874, 880, 881, 885—889, 892, 893, 907, 911, 914, 916, 919, 931, 936—939, 942—944, 948, 951, 952, 962, 966, 974, 980, 983, 988, 994, 995, 1000—1002, 1005, 1006, 1008, 1010, 1012—1020, 1023, 1033, 1039, 1044, 1045, 1063, 1064, 1080, 1084, 1092, 1099, 1100, 1101, 1103—1105, 1107.
Stockholm Bell Telephone Co., Ltd. 1011, 1015, 1016, 1018, 1019, 1020.
— Burgher School. 938.
— Exhibition. 413.
— General Telephone Co., Ltd. 1010, 1015—1020.
— High-School see University of Stockholm.
— Lock. 956, 957.
— Län. 33, 94, 98, 114, 121, 281, 312, 521, 524, 528, 531, 575, 601, 629, 641, 693, 715, 770, 828, 836, 1039.
Stockholm Superphosphate Manufacturing Co. 856.
Stockholms-Bladet. 397.
Stockholms Dagblad. 397.
— Sjöförsäkringsaktiebolag. 1043.
— Skofabrik. 812.
— Stads Brandförsäkringskontor. 1044, 1045
— Stads Brandstodsbolag. 1045.
Stockholms-Tidningen. 397, 894.
Stockinet (manufacture). 799, 809.
Stockings. 808.
Stollberg. 704.
Stolpe, Hj. 448, 493.
Stomatol. 861.
Stone. 160, 753, 833, 835, 836, 922, 926, 991.
Stone-industry. 39, 44, 46, 768, 835—837, 1068.
Stoneware. 845.
Stora Karlsö. 567.
Stora Kopparbergs Bergslag. 645, 756, 757, 877.
Stora Sjöfallet. 365, 773.
Stora Varfvet. 874, 879.
Storbo Falls. 364.
Storfors. 642.
Stork. 65.
Storlien. 364, 934.
Storms. 34.
Storsjön, Lake. 42, 50, 677.
Storskifte see Re-parceling of Land.
Storsylen. 10.
Storting. 185, 379.
Storvik. 41.
Storuman. 11.
Strahlenberg, F. J. von. 489.
Strand (Saw-mill). 645.
Strandberg, K. V. A. 405.
Straw. 537, 902.
Strawberries. 546, 788.
Straw-hats. 902.
Strehlenert, R. 807, 808, 809, 909.
Strelbitsky, I. A. 2.
Strengnäs. 108, 416, 934.
Striberg. 687, 691, 700, 704.
Stridsberg & Biörk. 881.
Strikes. 1066, 1067.
Strindberg, A. 407.
—, N. 492.
Strinnholm, A. M. 446.
Stripa. 687, 691, 700.
Strássa. 691.
Ström (Wool factory). 798.
Ström, I. A. af. 633.
Strömman, F. O. 646.
Strömming see Smallherring.
Strömnäs. 643.
Strömsbro. 801.
Strömsholm. 554, 555.
Strömsholm Canal. 956, 957.

Digitized by Google

Strömstad. 24, 28, 245, 948, 966, 980.
Ströms vattendal. 11.
Students. 324, 325, 338.
›Students and Workmen‹. 1102.
Studs. 194, 551, 554, 555.
Stud General Board. 589.
Stuorevare. 10.
Stureplan. 109.
Sturtzenbecker, A. F. 442.
Sturzen-Becker, O. P. 405.
Styffe, C. G. 447.
Stål, K. 471.
Stålfors. 881.
Stånge Head. 19.
Stäck, J. 425.
Städernas Allmänna Brandstodsbolag. 1045.
Städjan. 11.
Subsoil-Draining. 515.
Succession. 80, 170, 171, 174, 175.
Sue, Eugène. 405.
Suffrage. 143, 180, 249, 250, 265, 274, 1107.
Sugar. 154, 156, 775, 779, 783, 921, 931.
Sugar-beets. 537, 538, 546, 554, 779, 784.
— Factories. 781, 782, 1068.
— Refineries. 770, 783, 1068.
Suicides. 92, 147, 149.
Sulitelma. 10, 11, 754.
Sulphate. 821.
— of Copper. 754.
Sulphite. 821.
Sulphur. 682, 753, 754, 856.
Sulphuric Acid. 855, 856.
Summer Courses. 317.
Summer-Villas. 165.
Sund. 645.
Sunday and Evening Schools. 938, 939.
— Labour. 988, 1070, 1079.
Sundberg, C. 461.
—, K. G. 434.
Sundbyberg. 828, 892.
Sundbärg, F. III. v, x, 415.
—, G. 455, 457.
Sundelin, U. R. F. 436.
Sundevall, F. E. 458.
—, K. J. 442, 470.
Sundsborg. 546.
Sundsvall. 47, 103, 106, 108, 365, 415, 638, 662, 663, 666, 667, 772, 789, 887, 889, 890, 919, 931, 938, 948, 962, 980, 1006, 1009, 1011, 1105.
Sundsvall Commercial College. 938.
Sundsvalls-Posten. 397.
Sundsvalls Tidning. 397.
Superphosphate. 752, 856.
Supplementary Grant. 209.
Supplies. 208.
Surahammar. 877.
Surgery. 237, 243, 463.
Surte. 845, 847.
Survey. 194, 200, 201, 203.
Svalöf. 568, 605, 606.
Svanberg, A. F. 475.
—, G. 483, 485.
—, J. 483.
—, L. F. 479.
Svanberg & Co. 777.
Svaneholm. 512, 815.
Svanå. 542.
Svappavara. 40, 687, 691.
Svartsjö. 234.
Svartvik. 645.
Svartå. 980.
Svartelfven. 41.
Svartön. 694.
Svea (Insurance Company). 1044, 1046.
Svealand. 3, 4, 31, 33, 64, 65, 68, 69, 73, 92, 93, 98, 147, 168, 232, 497, 1004.
Svea Hofrätt. 230, 232.
Svea Velocipedes. 879, 880, 908.
Svecia (Insurance Company). 1046.
Svedala. 880.
Svedberg, Jesper. 262, 441.
Svedbom, V. 433.
Sveg. 28.
Svennberg, T. 435.
Svenonius, Fr. III, 495.
Svensén, E. III, 119, 447, 457.
Svenska Centrifugaktiebolaget. 586, 880.
Svenska Dagbladet. 397.
— Diamantbergborrningsaktiebolaget. 700.
— Fotogenköksaktiebolaget. 881.
— Glasförsäkringsaktiebolaget. 1049.
— Juteväfveriaktiebolaget. 806.
— Järnsängsfabriken. 881.
— Karbid- och Acetylenaktiebolaget. 881.
— Lifförsäkringsbolaget. 1046.
— Morgonbladet. 397.
— Slöjdföreningen see Swedish Industrial Art Society.
Svensk Hemslöjd see Swedish Home-sloyd, Society of.
— Konstslöjd see Swedish Art Industry Co., Ltd.
Sverdrup, Otto. 378.
Sveriges Allmänna Sjöförsäkringsaktiebolag. 1043.
— Frostförsäkringsbolag. 1049.
— Ångfartygsassuransförening 1043.
Sverker. 73.
Svängsta. 881.
Svärdström, Valborg. 433.
Swallow. 62.
Swan. 62, 670.
Swartz, E. 434.
—, J. D. 422.
—, J. G. 575, 577, 909.
—, O. 467, 489.
Swartz' Tobacco Factory. 792.
Svedenborg, Emanuel. 67, 88, 262, 271, 436, 472, 485.
Swedes (= Swedish Turnips). 537, 538.
Swedish Academy. 375, 379, 397.
— Art Industry Co., Ltd. 904.
— Beam. 56, 57.
— Bible Society. 270.
— China Mission. 270.
— Church Mission. 270.
— Cremation Society. 285.
— Domestic Industry Association see Swedish Home-sloyd, Society of.
— Home-sloyd, Society of. 905, 1104.
— Industrial Art Socity. 907.
— Life Saving Society. 285.
— Missionary Society. 270.
— Mission Union. 269, 271.
— Pilot, The. 204.
— Society for Anthropology and Geography. 378, 465.
— Society for Promoting Temperance and Culture. 284.
— Teachers' Journal. 293.
— Temperance Society. 277, 284.
— Touring Club. 360, 361, 367.
— Women's National Council. 274, 275.
— Workmen's Association. 1066.
Swedish-Danish-Russian Telephone Co., Ltd. 1020.
Swedish-Norwegian Commerce Treaty. 190, 922, 928, 929.
Sweets. 783.
Swift. 62.
Swift, Jonatan. 401.
Swimming. 297, 362, 368, 372.
Switzerland. 1, 2, 3, 113, 123, 124, 137, 142, 147, 154, 283, 301, 354, 356, 467, 930, 977, 979, 1010, 1045.
Swords. 220.
Sydsvenska Dagbladet. 397.
Sylarne. 9.
Sylvius, J. 422.
Sylwan, O. 450.
Syphilis. 147, 149.
Syrup. 788.
Sågmyra. 758.
Säbyholm. 546.
Säfveån Co., Ltd. 646.
Särna. 629, 631, 632.
Särnström, C. G. VII.
Säter. 108.
— (Saw-mill). 646.

Digitized by Google

Sätherberg, H. 356.
Sätra. 246.
Säve, C. 442.
Sävenäs. 642.
Söderbaum, H. G. VI. 480.
Söderberg, E. IV, 457.
—, H. 408.
—, J. 1098.
—, S. M. 443.
— Fund. 1098.
Söderblom, A. v.
—, N. 436.
Söderbloms Gjuteriaktiebolag. 587, 880.
Söderfors. 646, 708, 728, 764.
Söderhamn. 23, 54, 106, 108, 664, 889, 919, 948.
Söderköping. 245, 366, 934, 948, 960.
Söderman, A. 432, 433.
Södermanland (Prov.). 3, 4, 38, 40, 50, 134, 135, 147, 154, 161, 545, 575, 580, 796, 881.
Södermanland Län. 33, 94, 98, 114, 281, 521, 524, 525, 528, 531, 575, 641, 693, 715, 770.
Södermark, O. J. 424.
Söderslätt. 21.
Södertelge. 108, 772, 806, 875, 880, 948, 954.
Södertelge Canal. 956, 957, 959.
— Mechanical Works. 875, 880.
Söderwall, K. F. 443.
Söderåsen. 21, 22, 45.
Södra Varfvet. 960.
Sölvesborg. 811, 944, 948, 960.
Sörensen, P. M. 886.

Taberg (in Småland). 685, 689, 691.
— (in Vermland). 687.
Tailors. 348, 900.
»Talis Qualis». 405.
Tallberg, A. 430.
Tallow. 920, 922, 927.
Tamm, F. A. 443.
Tanneries. 810, 811.
Tar. 667, 768, 814, 920, 922, 927.
Taraval, G. 423.
Tar-hollows. 667, 668.
Tariff (customs). 932.
— Union. 1045.
Tar Trading Companies. 911.
Tattersall. 414.
Taxation. 142, 143, 208, 251, 260, 278, 504.
Tea. 154, 156.
Teachers. 290, 291, 292, 325, 327.
— Associations. 293.
Teachers Training Colleges. 307, 311.
Teaching. 293, 294, 295, 297, 299.
Teal. 61.
Technical Colleges. 343, 346.
— Education. 286, 342.
— High School. 342—345, 413, 761, 762, 809.
— Schools. 251, 343, 346, 347, 907.
Tegelviken. 874.
Tegnér, Elof. 447.
—, Esaias Jun. 443, 444.
—, Esaias Sen. 92, 319, 403, 404.
Telegrams. 1007, 1008, 1009.
Telegraph Apparatus. 881.
Telegraphs. 194, 206, 207, 274, 508, 1006.
Telephone Apparatus. 881, 1010, 1011, 1014, 1020.
Telephones. 508, 1010—1020.
Temperance Movement. 276—284.
Temperature. 23, 24, 27, 28, 31, 35.
Tenants. 145, 520, 617, 618.
Tenement-labourers. 610, 611, 614, 615.
— Soldiers. 214.
Tenure of Land. 518, 520, 617.
Tengdahl, K. 1080.
Tenhult. 20.
Tern. 66.
Tertiary System. 46, 47.
Tessin, K. G. 377, 423.
—, Nikodemus, Jun. 412, 416, 417.
—, Nikodemus, Sen. 412, 413.
Testing of Materials. 345, 761, 908.
Teutonic Race. 134.
Textile Industry. 768, 793, 809, 902, 1068.
Textiles. 793, 920, 921, 922, 923, 927, 928.
Thaer, Albr. 591, 594.
Thalén, T. R. 476, 698.
Tham, K. V. S. 495.
Théel, Hj. 471.
Theft. 153.
Thegerström, R. 429.
Theodolite. 704.
Theology. 435, 436.
Theorell, A. G. 486, 886, 909.
Thermænius, E. 881.
Thing. 72, 73, 170, 249.
Tholander, H. 720.
Thomander, J. H. 436.
Thomas-phosphate. 857.
Thomas Slag. 744
Thomson, K. G. 470.
Thorburn, E. 415.
Thorburn's Cask-factory. 828.
Thorell, T. 471.
Thorell, Hildegard. 427.
Thorild, T. 87, 402, 438, 452.
Thorwaldsen, B. 87, 418.
Thraldom. 74, 141, 170.
Thrashing-machines. 541, 543, 881.
Thread. 793, 794, 801, 806, 920, 921, 923, 926, 927, 931.
Thread-gloves. 808.
Thule (Insurance Company). 1046.
Thunberg, K. P. 87, 467, 470, 489, 542.
Thunder. 34.
Tiberg Inclinator. 698.
Tidaholm. 544, 804, 826.
Tidander, L. G. VIII, X.
Tidö Castle. 162, 411.
Tieck, Joh. Ludw. 403.
Tigerstedt, R. 460.
Tilas, D. 473, 697.
Tile. 46, 842, 844, 845.
— Stoves. 159, 844.
Tilghmann. 821.
Timber. 499, 621, 632, 633, 635, 637, 639, 641, 657—667, 768, 818, 919, 920, 923, 924, 926, 927, 929, 945, 946, 991.
— Cutting. 646.
— Transport. 659.
Timothy. 539.
Tin. 753, 755, 867, 881, 884, 885, 1059.
Tirén, J. 166, 361.
Tiselius, D. 485.
Tisell's Seed-grain Riddle. 544.
Tithes. 253, 254.
Title (of the King). 168, 184.
Titmouse. 62, 64.
Tiällmann, N. 441.
Tjolöholm. 555.
Tjäura. 10.
Toad. 62.
Tobacco. 154, 156, 541, 770, 775, 791—793, 921, 926, 929, 931, 1068.
Tobogganing. 370, 371.
Tomtabacken. 20.
Tomteboda. 309.
Tonnage. 942—948, 950, 957.
Tools. 69, 700, 880, 923, 928.
Topelius, Z. 406.
Topography. 202, 203.
Torell, Otto M. 339, 470, 474, 490.
Tornberg, F. W. 881, 886.
—, K. J. 444, 449.
Torne River. 2, 6, 54, 677.
Torne Lake. 5, 10, 11, 40, 365, 988.
Tornérhjelm, R. 575.
Torp (Mechanical Works). 879, 880, 881.
Torpare see Crofters.
Torpa Spring. 246.
Torpedoes. 225, 226.
Torpshammar. 757.

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Torpsjön, Lake. 365.
Torskog Mechanical Works. 879.
Torssell, A. 435.
Torsslow, O. U. 434.
—, S. F. 434.
Torstensson, Lennart. 85.
Tortoise. 66.
›Tossing the caber‹. 372.
Touring. 359—367.
Tourist Huts. 360, 361.
Town Councils. 179, 252, 259, 299, 303, 1108.
— Hall. 412.
Towns. 103, 104, 105, 110, 114, 125, 128, 141, 154, 160, 163—165, 171, 180—182, 195, 229, 230, 239, 247—252, 254, 259, 279, 281, 772, 896, 998.
Trade Inspectors. 1071.
— Marks. 1058, 1059.
— Unions. 275, 396, 1064, 1065, 1080.
Tramways. 888, 994, 995.
Tranchell, Th. 873.
Treacle. 783.
Treasury. 191, 194, 201, 1022.
Treaties. 913, 970, 1022.
Tre Kronor (Flour-mill). 777.
— (Insurance Company). 1049.
Trelleborg. 366, 880, 889, 947, 948, 980, 1004.
Treuleben, F. A. von. 964.
Triassic System. 36, 37, 44, 45.
Trilobites. 43.
Troil, S. G. von. 996.
Troili, U. 424.
Trolleholm. 162.
Trollhättan. 103, 819, 854, 872, 873, 879, 880, 881, 888, 985.
— Canal. 955—957, 959.
— Falls. 17, 47, 363, 769, 956.
— Foundry and Mechanical Works. 872, 879, 880, 985
Trondhjem. 980.
Trotting. 373, 374.
Trout. 678.
Trybom, F. 674.
Trygg (Insurance Company). 1046.
Trystorp. 581.
Trångfors. 887.
Trångsviken. 643.
Tuberculosis. 247, 563. Cf. Consumption.
Tug-of-war. 368.
Tullberg, O. E. 444.
—, S. A. 473.
—, T. III, 471.
Tullgarn. 795.
Tumba. 831.
Tunaberg. 758.
Tunadal. 645.
Tunafors. 881, 883, 884.
Tunnels. 983.
Turbines. 872, 880.
Turbot. 676.
Turkey. 568.
Turnips. 537, 538, 546.
Tyfors. 646.
Type-foundries. 894.
Täckhammar. 161.
Tännforsen Falls. 40, 41, 364.
Tärendö-river. 6.
Tärna. 317.
Törefors. 642.
Törnebohm, A. E. 474, 495.
Törngren, L. M. v.
Törnqvist, L. 474.

Uchatius, Fr. von. 752.
Uddby. 887.
Uddeholm. 708, 744.
Uddevalla. 106, 828, 948, 980, 1011.
Ulfsson, J. 421.
Ulfvik. 644.
Ullrich, F. 415.
Ulricehamn. 20.
Ulrich, Valborg. 1105.
Ulriksdal. 546.
Ultuna. 548, 594—596, 604.
Umbrellas. 809, 881.
Ume elf. 6, 10, 657, 677, 983.
Umeå. 24, 28, 604, 667, 887, 889, 948.
Union (with Norway). 89, 96, 168, 184—186, 188.
Act. 185, 186, 188.
— Committee. 188.
Union (Insurance Company). 1046.
United Artistic Foundries. 907.
— Council. 186, 188.
United Kingdom. 620, 664, 752, 925, 927, 930, 947, 948, 970, 977, 979.
United States. 91, 130, 132, 154, 270, 272, 301, 354, 525, 529, 535, 638, 692—694, 715, 750, 790, 930, 948, 1010.
Universal Peace. 285.
— Postal Union. 1002.
University Entrance Examination. 324, 332, 338.
— Extension. 312, 317.
Universities. 273, 286, 325, 333—342
University of Gothenburg. 333, 338, 340, 341, 342, 1098.
— of Lund. 108, 237, 263, 333, 336—340, 386, 394, 437, 447, 460, 469, 470, 481, 496, 590, 593.
— of Stockholm. 274, 333, 338, 340, 341, 469, 481, 482, 1098.
— of Uppsala. 78, 89, 92, 108, 237, 263, 333, 334, 336—340, 356, 386, 393, 394, 396, 414, 420, 437, 442, 444, 447, 469, 470, 481, 496, 590, 593.
Upmark, G. 451.
Uppland. 3, 4, 16, 18, 38—40, 50, 64, 66, 72, 135, 162, 399, 410, 411, 421, 495, 539, 551, 836.
Uppling, M. F. x.
Uppsala. 2, 18, 24, 28, 34, 69—71, 78, 80, 89, 92, 106, 108, 170, 237, 263, 274, 310, 316, 326, 328, 329, 333, 334, 336, 338, 339, 360, 363, 372, 378, 383—385, 414, 416, 419, 431, 439, 440, 449, 454, 458, 460, 461, 462, 466, 471, 477, 482—486, 488, 548, 772, 777, 789, 892, 934, 948, 980, 1006, 1102, 1103, 1104.
— Cathedral. 261, 410, 413, 415, 416, 417, 420, 424.
Uppsala-Ekeby (Tile-factory). 844.
Uppsala Län. 33, 94, 98, 114, 131, 281, 521, 524, 528, 531, 641, 645, 693, 715, 725, 770.
— Private College. 329.
— Synod. 262, 267.
Uppsala-åsen. 18.
Uppström, A. 444.
Ural. 890.
Uranienborg. 484.
Urban Population. 103, 105, 106, 110.
Uruguay. 301.
Usselincx, W. 911.
Utnäslöt. 555.

Vacation Colonies. 298.
Vaccination. 112, 245, 462.
Vadstena. 42, 75, 76, 79, 91, 261, 264, 270, 383, 409, 411, 892, 904, 948.
Valand (Insurance Company). 1046.
Valhalla. 71.
Vallée, Jean de la. 412.
Vanadis (Insurance Company). 1046.
Vannérus, A. 441.
Vansbro. 646.
Varberg. 18, 245, 429, 948.
Vargön. 831.
Varingians. 70.
Varnhem. 73, 409.
Varnish. 818.
Vasa Bridge (in Stockholm) 105.
Vasa (Insurance Company) 1046, 1049.
Vasa Line. 79, 171.
Vassenius, B. 485.
Vattholma. 39.
Vaxholm. 221, 228, 880.
Vedevåg. 881.
Vega Expedition. 90, 490, 491.

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Vega Fund. 378.
- (Insurance Company). 1043.
Vegetables. 546.
Vegetation. 51.
Velander, J. P. III, IV, VIII, X.
Velocipedes. 867, 880, 908.
Velvet-scoter. 66.
Vena. 758.
Vendace. 678.
Venden. 168.
Venereal Diseases. 147, 149, 239, 240.
Venern Lake. 17, 42, 48, 50, 69, 128, 363, 411, 646, 677, 954, 956, 958, 959, 980.
Venersborg. 24, 42, 306, 308, 1006.
Venice. 429, 488.
Verbruggen. 416.
Verdandi. 396.
Verden. 83.
Verelius, O. 441, 444.
Vermland (Province). 2, 3, 4, 5, 13, 14, 16, 38, 39, 40, 41, 135, 202, 421, 568, 580, 637, 646.
— Län. 33, 94, 98, 114, 116, 126, 127, 152, 497, 521, 524, 528, 531, 536, 620, 629, 641, 693, 715, 770, 822, 847, 934, 1004, 1035.
Vernamo. 980.
Vertebrate Animals. 61, 62, 64, 65, 66, 67.
Vessels. 224, 867, 868, 921, 923, 926, 943, 945.
Vestanfors. 735, 737, 887.
Vestanå. 40.
Vestberg, A. 461.
Vesterbotten (Province). 3, 4, 38, 59, 93, 100, 135, 166.
— Län. 33, 94, 98, 99, 114, 121, 131, 497, 521, 524, 528, 531, 570, 575, 601, 621, 629, 631, 632, 633, 641, 642, 670, 673, 770, 901, 902, 995, 996, 1004.
Vestergötland. 3, 4, 16, 20, 42, 43, 44, 57, 64, 65, 68, 72, 81, 135, 373, 392, 409, 411, 555, 556, 559, 580, 776, 784, 804, 995.
Vesternorrland Län. 33, 93, 94, 98, 99, 114, 116, 126, 457, 521, 524, 528, 531, 575, 601, 620, 641, 642, 643, 657, 715, 770, 822, 853.
Vestervik. 24, 28, 948, 966.
Vesterås. 24, 106, 319, 453, 603, 880, 882, 887, 888, 890, 934, 948, 1006.
Vestmanland (Province). 3, 4, 38, 39, 40, 41, 135, 162, 392, 542, 554, 555, 573, 980.
— Län. 33, 94, 98, 114, 521, 524, 525, 528, 531, 575, 641, 693, 715, 725, 770.
Vestries. 249.
Vestry Board. 265.
Vetches. 524, 551.
Veterinary Institute. 598.
— Surgeons. 193, 237, 598.
Vettern Lake. 16, 17, 42, 50, 68, 69, 79, 95, 102, 128, 363, 364, 411, 677, 954, 956, 959, 980, 995.
Vexjö. 24, 28, 309, 327, 934, 980.
Victoria, H. R. H. the Crown Princess. 795.
Victoria (Insurance Company). 1044, 1046.
— Museum. 385.
Vidtsköfle. 83, 555.
Vieille Montagne. 758.
Vienna. 457, 788.
Vifsta Varf. 637, 644.
Vii. 887.
Vik. 410.
Vikings. 70, 222, 367, 371.
Vikmanshyttan. 751, 752.
Village-roads. 996, 998.
Villages. 248, 512, 513, 615.
Villas. 165.
Vincent. 592.
Vindel elf. 983.
Vinegar. 787.
Vingåker. 154.
Vinterviken. 858, 859.
Viper. 61, 62.
Virginia. 792.
Virum. 754.
Visby. 24, 28, 32, 72, 106, 108, 163, 218, 245, 363, 373, 409, 410, 421, 880, 910, 911, 943, 948, 960, 962, 966.
Vising, P. J. 444.
Visingsö-group. 42, 364.
Viskafors. 801, 803.
Viskan. 677.
Vitalis. 403.
Vital statistics. 92, 96, 100, 198, 199, 456, 1107.
Vitriol. 754.
Vive. 453.
Vivisection. 285.
Vojmsjön. 11.
Voltaire. 402, 404, 452.
Volunteers. 221.
Vulcan Match-Factory. 826.
— Mechanical Works. 879, 880.
Vångforsen Rapids. 55.
Vårdinge. 39.
Vårt Land. 397.
Väddö Canal. 957.
Vännäs. 983.
Värnanäs. 56.
Vårtan Harbour. 646, 889.

Wadstein, A. E. 444.
Wadström, K. B. 88.
Wærn, J. 463.
Wærn, L. 454.
Wages. 502, 613, 614, 615, 1078.
Wagner, R. 432.
Wagtail. 62, 66.
Wahl, A. de. 435.
Wahlberg, Alfr. 425.
—, J. A. 489.
—, P. F. 461.
Wahlenberg, G. 461, 467, 473, 489.
Wahlgren, A. N. H. VII.
Wahlund, C. W. 444.
Waldau, G. 493.
Waldenström, P. P. 269, 436.
Walin, Ingeborg. 1102.
Wallander, A. 428, 905, 906.
Wallbergs Fabriksaktiebolag. 798, 799, 800, 809.
Wallenberg, G. VIII.
—, K. A. I.
Wallengren, H. 472.
Wallenstein, Albr. 82.
Waller, C. IV.
—, P. A. 965.
Wallerius, J. G. 472, 477, 511, 591.
—, N. 438.
Waller Tube. 965, 966.
Wallin, J. O. 92, 267, 269, 319, 402, 431.
— School. 329.
Wallis, C. VI, 461.
Walloon Forging. 727, 728.
Walloons. 93.
Wall-papers. 832.
Wallroth, K. A. IX.
Walnuts. 545, 546.
Walpole, R. 87.
Walpurgis Night. 158.
Warbler. 64.
Warburg, K. 450, 451.
Warfwinge, F. W. 462.
Warehousing. 933.
Wargentin, P. V. 87, 456, 482.
Warsaw. 1020.
Washington. 281.
Watches. 868, 879, 881, 886.
Waterfalls. 40, 41, 47, 364, 500, 772, 773, 774.
Water-gas. 853.
Water-lilies. 57.
Water-mills. 776.
Water-power. 772, 773, 887, 888.
Waterproof Stuffs. 808, 809.
Water-shrew. 62.
Water System. 5.
Watering-places. 246.
Wawrinsky, R. 461.
Wax. 569.
Waxwing. 65.
Wealth, Distribution of. 144, 145.
Weasel. 61, 62.
Weaving Schools. 795, 904.

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Weber, K. M. 432.
Weckerlin. 592.
Wedding. 158.
Wedholms Mejerikärlsfabrik. 586, 881.
Weibull, Martin. 447.
—, Mats. VII, 593.
Weights. XI, 1061.
Welander, E. 463.
Welin, A. 909.
—, G. VIII.
Welinder, B. 605.
Wendt, W. 787.
Wennberg & Ramstedt. 777.
Wennerberg, G. 431.
—, G. G:son. 904, 906.
Wenström, G. 809.
—, J. 862, 879, 890, 909.
Wenström's Separator. 704.
Werner, A. G. 472.
Wertmüller, A. U. 423.
Wester, A. 493.
Westerlund, C. A. 472.
Westerman see Liliencrantz.
Westermark, F. 464.
Western Europe. XI, 147, 149, 154, 498, 522, 525, 527, 529, 537, 550, 551, 556, 566, 568, 619, 781.
Westin, F. 424.
Westman, A. J. 844.
—, C. 905.
—, E. V. 717, 909.
—, J. 488.
West Indies. 467.
Westphalia. 694.
Westrin, T. 447.
Westring, N. 472.
Wetterbergh, K. A. 405.
Wettergren & Co. 809.
Wetterstrand, O. G. 463.
Wheat. 154, 155, 156, 522, 524, 525, 526, 527, 528, 529, 531, 532, 533, 535, 551, 777, 926, 928, 929.
Wheat-ear. 62.
Whey. 580.
Whey-cheese. 581.
White Beer. 284.
— Chalk. 46.
Whitewood. 659, 660.
Whiting. 676.
Whortleberry. 53, 55, 921.
Wiberg, M. 909.
Wiborgh, J. VII, 857, 909.
Wicander's Cork-factory. 833.
Wickenberg, P. G. 425.
Wickman, G. 415.
Wicksell, K. 119, 455.
Wide, A. V, 356.
Widebeck, Maria. 904.
Widman, O. 480.
Widmark, J. 464.
Wieselgren, H. 447.
—, P. 276, 277, 283.
—, S. 281.
Wijkander, A. 477, 486, 487.
Wiklund, K. B. 444.
W. Wiklunds Verkstäders Aktiebolag. 789, 880.
Wikner, P. 436, 440, 441.
Wilcke, G. D. 869.
—, J. K. 475.
Wild Boar. 66.
— Duck. 62, 65, 670.
— Reindeer. 62, 66, 672.
— Rose. 57.
Willow. 53, 54, 56.
Willow-grouse. 62, 64.
Wiman, A. 481.
Winberg, H. VI, 593.
Winborg & Co., Th. 787.
Wind-mills. 776.
Winds. 23, 34.
Wine. 154, 156, 284, 367, 788, 921, 929.
Winge, Hanna. 904.
—, M. E. 425.
Winnowing-machines. 543, 881.
Wire. 867.
Wirén, A. 472.
Wirsén, C. D. af. 406, 450.
Wisén, T. 443.
Wising, P. J. 462.
Wismar. 83, 85.
Wissler, A. H. 420.
Wistrand, A. H. 461.
Wittrock, N. B. 468.
Wolf. 62, 64, 671.
Wolff, E. von. 592.
—, Kr. von. 438.
Wolverene. 62.
Woman Question. 272—276, 406.
Women Workers. 1070.
Wood. 160, 502, 667, 709.
Wood-carving. 905.
Woodcock. 64, 670, 672.
Wooden Shoes. 829.
Wood-grouse. 670, 672.
Wood-oil. 815.
Woodpecker. 62, 65.
Wood Pulp. 632, 633, 770, 819, 820, 821, 822, 829, 924, 926, 928, 929, 1068.
Woods. 36, 54, 55, 56, 57, 58, 619, 620, 621.
Wool. 516, 795, 796, 798, 926.
Workhouses. 234, 235, 255.
Working Men's Library. 396.
— Men's Unions (= Workmen's Associations). 396, 939, 1064.
Workmen's Building Society. 1088.
— Dwelling Accomodation Company, Ltd. 1088.
— Dwelling Company, Ltd. 1085.
— Homes. 1084—1089, 1102.
— Institutes. 312, 316, 396.
Workshops for Children. 297, 303, 304, 305, 382.
World's Student Christian Federation. 270.
Wrangel, C. G. 592.
—, E. 450.
—, H. IV.
Wrede, F. 476.
Wren. 65.
Wrestling. 368.
Wretlind, E. W. 356.
Wrought Iron. 715, 725—735
Wuchters, Abr. 422.
Wulff, F. A. 442, 444.
Wurmb. 936.
Wåhlin, A. 579.
Wästberg, Carin. 904.

Yachting. 362, 371.
Yarn. 793, 794, 796, 798, 801, 806, 920, 921, 923, 926, 927, 928, 929.
Yarrow. 224.
Yeast. 787.
Yoldia-sea. 15, 48, 49.
Young Men's Christian Association. 270, 1087, 1101.
— Women's Christian Association. 270, 1101.
Ystad. 21, 45, 46, 320, 587, 772, 880, 931, 948, 960.
Ystads Gjuteri och Mekaniska Verkstad. 587, 880.
Ytterby. 39.
Yule. 158, 568.

Zander, C. M. 444.
—, G. 354, 356, 357, 862, 881, 909.
— Institutes. 358.
Zeipel, K. von. X.
Zetterstedt, J. W. 470.
Zettervall, H. 413.
Zinc-ore. 41, 682, 753, 757, 758, 922, 929.
Zoological Gardens. 391.
— Museums. 339.
Zoology. 470.
Zorn, A. 429, 430.

Åbacka. 645.
Åberg, L. H. 440.
Åbergsson, G F. 434.
Åbo. 333, 883.
Åby. 881.
Ådö. 546.
Åhlander, Tekla. 435.
Åhlström, O. 432.
Åhus. 18, 46, 934.
Åker. 542, 860, 861.
Åkerberg, E. 433.
Åkerblad, J. D. 442.
Åkerblom, Fr. 593.
Åkerlindh, A. IV.
Åkerman, J. 464.
—, N. 354.

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Åkerman, V. 420.
— & Lund. 885.
Åland Sea, The. 32, 67.
Ålkasfjällen. 10.
Ammeberg. 41, 700, 704, 758.
Åmot. 881.
Ånge. 980.
Ångermanelfven. 6, 15, 55, 102, 365, 643, 657, 677, 981, 982.
Ångermanland. 3, 4, 14, 38, 41, 135, 247, 625, 630, 637, 647, 804.
Ångström, A. J. 475, 476.
—, K. VI, 477.
Åre. 10, 364.
Åreskutan Mt. 6, 9, 10, 44.
Åsar. 17, 48.
Åsboberg see Striberg.
Åtvidaberg. 40, 588, 685, 754, 760.

Ädelfors. 689, 758.
Ägir (Insurance Company). 1043.

Alfängen. 39.
Åtran. 677.

Ödmann, A. 433.
—, S. 436.
Ödmansson, E. 463.
Öfverum. 542, 880.
Öhrwall, Hj. 460.
Öland. 3, 4, 19, 20, 22, 33, 42, 48, 50, 58, 61, 135, 364, 412, 497, 525, 531, 533, 538, 569, 789, 839.
Örebro. 24, 28, 39, 106, 108, 346, 359, 414, 587, 603, 606, 795, 880, 881, 887, 888, 889, 984, 980, 985, 1006, 1105.
— Canal. 956, 957.
— Län. 38, 39, 94, 98, 114, 126, 513, 521, 524, 525, 528, 531, 575, 641, 646, 692, 715, 725, 770, 836, 845, 858, 886, 902.
Öre elf. 14, 15, 982, 983.
Öresund. See Sound, The.
— (Insurance Company). 1043.
Öringe. 936.
Örnberg & Andersson. 881.
Örnsköldsvik. 948.
Örtenblad, Th. VII.
Östberg, Carolina. 433.
Österby. 751.
Östergren, Hj. VI.
Östergötland (Province or Län). 3, 4, 16, 33, 38, 39, 40, 42, 43, 48, 50, 64, 65, 68, 72, 73, 74, 75, 91, 94, 98, 114, 135, 313, 366, 392, 521, 524, 525, 526, 528, 531, 575, 580, 584, 614, 641, 646, 685, 693, 715, 725, 770, 784, 796, 801, 809, 831, 836, 881, 1091.
Östergötlands Dagblad. 397.
Österslätt. 21.
Östersund. 24, 887, 889, 1101.
Österåsen. 247.
Östgöta Correspondenten. 397.
Östlind & Almqvist. 885.
Östrand. 644.

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Errata.

Page 5, line 5 from the bottom. Instead of: flow, *read:* run.
» 21, line 8 a. 9 from the top. Instead of: more successful here that have rendered agriculture, *read:* that have rendered agriculture more successful here.
» 91, line 12 from the top. Instead of: somewhat, *read:* about.
» 128, line 11 from the bottom. Instead of: in way, *read:* in a fair way.
» 210, line 10 from the bottom. Instead of: strategics, *read:* strategetics.
» 212, line 12 from the top. Instead of strategics, *read:* strategetics.
» 252, The Swedish word: Kommunalnämnd, here translated by Vestry Board. ought more properly to be rendered: Community Commissioners.
» 284, Table 44. The number of the Table ought to be 46.
» 297, line 28 from the bottom. Instead of: *Continuation-Schools*, *read: Compensation-Schools.*
» 314, line 23 from the bottom. Instead of: Drawing Tools, *read:* Tool Drawing.
» 359. The Section headed Touring and Sport ought to be numbered 6 instead of 5.
» 399, line 4 from the bottom. Instead of: of divinities, *read:* with divinitics.
» 415, line 8 from the top. Instead of: p. 903, *read:* p. 909.
» 457, line 3 from the bottom. Instead of: Aperçues, *read:* Aperçus.
» 458, line 8 from the bottom. *Omit* », who».
» 481, line 12 a. 13 from the bottom. Instead of: been to take, *read:* to be taken.
» 498, line 2 from the top. Instead of: in pursuit of a livelihood of its inhabitants, *read:* of its inhabitants in pursuit of a livelihood.
» 499, line 12 from the bottom. Instead of: etc. use, *read:* use, etc.
» 514, line 17 from the top. Instead of: face, *read:* phase.
» 526, line 8 from the top. Instead of: in Kristianstad, *read:* in those of Kristianstad.
» 539, line 2 from the top. Instead of: corps, *read:* crops.
» 684, line 19 from the bottom. Instead of: us, *read*: ourselves.
» 719, line 11 from the top. Instead of: afterwards the, *read:* afterwards in the.
» 727, line 8 from the top. Instead of: cart, *read:* cast.
» 791, line 19 from the top. Instead of: 500,000, *read:* 550,000.
» 804, line 11 from the top. Instead of: nineteenth, *read:* eighteenth.
» 888, line 11 from the bottom. *Omit* the words within parenthesis.
» 1005, Table 159, last column, for the years 1896/00. Instead of: 2,303,886, *read:* 2,303,438.

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